CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

ORDER NO. R2-2004-0018
WASTE DISCHARGE REQUIREMENTS FOR:
U.S. FISH & WILDLIFE SERVICE AND CALIFORNIA DEPARTMENT OF FISH & GAME
SOUTH SAN FRANCISCO BAY LOW SALINITY SALT PONDS
ALAMEDA, SANTA CLARA, AND SAN MATEO COUNTIES

FINDINGS

The California Regional Water Quality Control Board, San Francisco Bay Region, hereinafter called the Board, finds that:

1. ***Discharger and Permit Application***. U.S. Fish & Wildlife Service and California Department of Fish & Game, hereafter jointly and independently referred to as the Discharger, recently purchased about 15,000 acres of salt ponds formerly owned by Cargill Incorporated in south San Francisco Bay (South Bay). The Discharger submitted a Report of Waste Discharge (ROWD) to the Board for discharge of low salinity waters from these ponds to waters of the State. The United States, through the U.S. Fish and Wildlife Service, owns a certain number of these ponds and the State of California, through the California Department of Fish and Game, owns the remainder of the ponds. In complying with the terms and conditions of this Order, the U.S. Fish and Wildlife Service is responsible for the acreage it owns and operates, including the Alviso and the West Bay Ponds, and the California Department of Fish and Game is responsible for the acreage it owns and operates, at the Baumberg Ponds. The locations of these pond systems are shown in Attachment A.

Facility Description

2. Cargill's south bay salt ponds consisted of five regional pond complexes: Baumberg, Newark #1, Newark #2, Alviso (including the Coyote Creek Island Ponds), and portions of Redwood City (West Bay Ponds). The complexes that the Discharger purchased from Cargill include: Baumberg, Alviso, and Redwood City. At this time, Cargill indicates that it will continue to make salt at Newark #1 and Newark #2. Cargill plans to remove brines in the Redwood City complex to below 150 parts per thousand (ppt) prior to transferring these ponds to the Discharger.

3. The Discharger developed an Initial Stewardship Plan (ISP) to operate and maintain ponds within the Alviso, Baumberg, and Redwood City (West Bay) complexes before restoration. The ISP indicates that planning and design for long-term restoration will take about five years, and that additional time will be required for implementation. Objectives of the ISP include: (a) ceasing commercial salt operations, (b) introducing tidal hydrology, (c) maintaining existing high quality water and wildlife habitat, (d) assuring ponds are maintained to facilitate long-term restoration, (e) minimizing management costs, and (f) meeting water quality standards.

4. The ROWD indicates that in implementing the ISP, the Discharger proposes to (a) circulate tidal flow through pond systems and release flows to the Bay or Sloughs, (b) manage some ponds to optimize habitat for migratory shorebirds and waterfowl while minimizing pumping costs, (c) manage some ponds at higher salinities to support specific wildlife populations, and (d) restore full or muted tidal action to the Island Ponds (Ponds A19, A20, and A21 in the Coyote Creek area). In order to manage pond water quality and salinity levels, the Discharger will install and maintain intake structures, pumps, and outlet structures.

5. The Discharger proposes to discharge saline waters from four salt pond areas that it divided into 19 systems that contain 54 ponds in total. The Alviso area comprising 7,500 acres contains six systems (five of which are permitted to discharge under this Order), the Baumberg area comprising 5,500 acres contains five systems, the Redwood City (West Bay) area comprising 1,600 acres contains five systems, and the Coyote

Creek area (a subunit with the Alviso Pond system) comprising 500 acres contains three systems. Each system has one or more discharge points to either the Bay or a slough. The California Department of Fish & Game owns and will operate the Baumberg area; and U.S. Fish and Wildlife Service owns and will operate the Alviso and West Bay areas, including the Coyote Creek area.

6. The findings below describe each pond system in more detail. While the hydraulic residence times indicated in Tables 1 through 10 reflect averages and will likely change based on management practices employed by the Discharger, they do illustrate the significant lag time and subsequent management constraints involved in reducing salinities or increasing dissolved oxygen levels by flow management alone. This suggests that the Discharger's operations plan needs to include within-pond-targets for certain constituents in order for it to implement corrective measures in a timely manner that will result in compliance with this Order's limitations.

Alviso Complex

7. The U.S. Fish and Wildlife Service owns the Alviso complex that contains 24 ponds within six separate systems, and comprises about 7,500 acres in Santa Clara and Alameda Counties. The Alviso Complex only contains evaporator ponds, and historically Cargill has pumped brines to Newark #2 site for crystallization and final processing.

8. ***Alviso System A2W***. This system consists of two ponds: The intake pond A1 will receive water at its northwesterly end from Charleston Slough via an existing 60-inch gate structure. From A1 an existing 72-inch siphon that runs under Mountain View Slough will transfer water to A2W. The outlet pond A2W will discharge pond water at its northerly end to the Bay through a new 48-inch gate structure (Discharge Point A-A2W-1). The maximum expected salinity from ponds in this system is 65 ppt (modeled salinity) for the initial discharge. For continuous discharges, the ROWD indicates that salinities should remain below 40 ppt. The tables below shows the expected summer and winter hydraulic residence times for this system.

Table 1A: Initial Stewardship Plan: Average Summer Hydraulic Residence Times for A2W

Pond	Area (acres)	Depth (ft)	Volume (acre-ft)	Outlet Flow (ft^3/s)	Residence Time (days)
A1	277	1.4	387.8	17	11.5
A2W	429	1.9	815.1	14	29.4
Complex	706				40.9

Table 1B: Initial Stewardship Plan: Average Winter Hydraulic Residence Times for A2W

Pond	Area (acres)	Depth (ft)	Volume (acre-ft)	Outlet Flow (ft^3/s)	Residence Time (days)
A1	277	1.7	470.9	18.4	12.9
A2W	429	2.2	943.8	19	25.0
Complex	706				37.9

9. ***Alviso System A3W***. This system consists of five ponds. The intake pond B1 will receive water from the Bay via an existing 36-inch gate structure (only allows inflow) and/or from a new 48-inch culvert. The outlet pond A3W will discharge pond water through three new 48-inch gates to Guadalupe Slough (Discharge Point A-A3W-1) near the Sunnyvale Water Pollution Control Plant (WPCP) outfall. The normal flow in this system follows two routes. One route will be from B1 to A2E to A3W. The second route will be from B1 to B2 and then to A3W. The ISP explains that most of the flow should follow the first route. This system also includes pond A3N, which will operate as a seasonal pond. This means that during the ISP the Discharger will drain pond A3N to A3W, then allow it to fill with rainwater during the winter, and dry during the summer. The Discharger indicates that, as necessary, water will be diverted from pond B2 to A3N and then

to A3W to control water levels and salinity. The maximum expected salinity from ponds in this system is 65 ppt (modeled salinity) for the initial discharge. For continuous discharges, the ROWD indicates that salinities should remain below 40 ppt. The tables below shows the expected summer and winter hydraulic residence times for this system.

Table 2A: Initial Stewardship Plan: Average Summer Hydraulic Residence Times for A3W

Pond	Area (acres)	Depth (ft)	Volume (acre-ft)	Outlet Flow (ft^3/s)	Residence Time (days)
B1	142	1.2	170.4	34	2.53
B2	170	1.0	170.0	30.6[1]	13.52
A2E	310	2.1	651		
A3W	560	1.8	1008	27	18.82
Complex	1182[2]				34.88

1 In this table, the outlet flow for B2 and A2E is a summation as these ponds operate in parallel. To estimate the hydraulic residence time of the system, Ponds B2 and A2E were assumed to have equal residence times. This would result in an outlet flow from pond B2 of 6.3 ft^3/s and from Pond A2E of 24.3 ft^3/s.

2 The area of the complex does not include Pond A3N (163 acres) since the Discharger proposes to operate it as a seasonal or batch pond and flows to this pond are not expected to be significant.

Table 2B: Initial Stewardship Plan: Average Winter Hydraulic Residence Times for A3W

Pond	Area (acres)	Depth (ft)	Volume (acre-ft)	Outlet Flow (ft^3/s)	Residence Time (days)
B1	142	1.7	241.4	32.25	3.77
B2	170	1.5	255	33.1[1]	18.52
A2E	310	3.1	961		
A3W	560	2.1	1176	34	17.43
Complex	1182[2]				39.73

1 In this table, the outlet flow for B2 and A2E is a summation as these ponds operate in parallel. To estimate the hydraulic residence time of the system, Ponds B2 and A2E were assumed to have equal residence times. This would result in an outlet flow from pond B2 of 6.9 ft^3/s and from Pond A2E of 26.2 ft^3/s.

2 The area of the complex does not include Pond A3N (163 acres) since the Discharger proposes to operate it as a seasonal or batch pond and flows to this pond are not expected to be significant.

10. ***Alviso System A7***. This system consists of three ponds. The intake pond A5 will receive water from Guadalupe Slough through two new 48-inch gate structures. From A5 the Discharger will route water to A7. The outlet pond A7 will discharge water through two new 48-inch gate structures to Alviso Slough (Discharge Point A-A7-1). The ROWD indicates that the Discharger intends to operate A8 as a seasonal or batch pond that will result in high salinities (between 120 and 150 ppt) to favor brine shrimp production. If operated as a seasonal pond during the ISP, the Discharger will initially drain pond A8, then allow it to fill with rainwater during the winter, and dry during the summer. The Discharger indicates that if it operates A8 as a batch pond, it will divert water from A7 to A8 then pump water from A8 to A7 or A11, as necessary, to control water levels and salinity. The maximum expected salinity from ponds in this system is 110 ppt (modeled salinity) for the initial discharge. For continuous discharges, the ROWD indicates that salinities should remain below 40 ppt in Ponds A5 and A7. The tables below shows the expected summer and winter hydraulic residence times for this system.

Table 3A: Initial Stewardship Plan: Average Summer Hydraulic Residence Times for A7

Pond	Area (acres)	Depth (ft)	Volume (acre-ft)	Outlet Flow (ft^3/s)	Residence Time (days)
A5	615	1.0	615	17.8	17.42
A7	256	0.9	230.4	16	7.26

Pond	Area (acres)	Depth (ft)	Volume (acre-ft)	Outlet Flow (ft^3/s)	Residence Time (days)
Complex	871[1]				24.68

[1] The area of the complex does not include Pond A8 (406 acres) since the Discharger proposes to operate it as a seasonal or batch pond and flows to this pond are not expected to be significant.

Table 3B: Initial Stewardship Plan: Average Winter Hydraulic Residence Times for A7

Pond	Area (acres)	Depth (ft)	Volume (acre-ft)	Outlet Flow (ft^3/s)	Residence Time (days)
A5	615	1.2	738	22.7	16.39
A7	256	1.1	281.6	23	6.17
Complex	871[1]				22.56

[1] The area of the complex does not include Pond A8 (406 acres) since the Discharger proposes to operate it as a seasonal or batch pond and flows to this pond are not expected to be significant.

11. ***Alviso System A14.*** This system consists of seven ponds. The intake pond A9 will receive water from Alviso Slough through two existing 48-inch gates. The outlet pond A14 will discharge water through two new 48-inch gate structures into Coyote Creek (Discharge Point A-A14-1). The route of flow through this system will be from A9 to A10 to A11 to A14. The Discharger proposes to operate ponds A12, A13, and A15 as batch ponds to maintain higher salinity levels (between 120 and 150 ppt) for brine shrimp habitat. To maintain appropriate water and salinity levels, the Discharger will provide limited flows to these ponds by transferring water from A11 to A12 and, may at times, route flow from A12 to A13 to A15 to A14 or A16. Additionally, the Discharger proposes to intake water, as necessary, at A15 from Coyote Creek through a new 48-inch gate and/or at A14 (the normal discharge point). Since water intakes at A9 have the potential to entrain migrating salmonids, the ROWD indicates that this system will not intake water from the Alviso Slough between December and April. Ponds for which continuous circulation will occur (i.e., A9, A10, A11, and A14) are projected to have maximum salinities of 100 ppt (modeled salinity) for the initial discharge and maximum salinities near 40 ppt for continuous discharges. The table below shows the expected summer hydraulic residence times for this system. Since the Discharger plans to close the intake structure at pond A9 during the winter to avoid entraining migrating salmonids, relatively small flows will discharge from this system in these months.

Table 4A: Initial Stewardship Plan: Average Summer Hydraulic Residence Times for A14

Pond	Area (acres)	Depth (ft)	Volume (acre-ft)	Outlet Flow (ft^3/s)	Residence Time (days)
A9	385	2.2	847	34.3	12.45
A10	249	2.6	647.6	31.9	10.23
A11	263	3.1	815.3	29.4	13.98
A14	341	0.9	306.9	26	5.95
Complex	1238[1]				42.61

[1] The area of the complex does not include Ponds A12, A13, and A15 (309, 269, and 249 acres) since the Discharger proposes to operate these ponds on a batch basis and flows to them are not expected to be significant.

12. ***Alviso System A16.*** This system consists of two ponds. A17 will intake water from Coyote Creek through a new 48-inch gate. From A17 an existing 50-foot levee gap will transfer water to A16. From A16 a new 48-inch gate structure will discharge into Artesian Slough (Discharge Point A-A16-1). In this system, both intake and discharge structures would include operable gates to close off all flow, allow inflow only, or outflow only. Ponds for in this system are projected to have maximum salinities of 135 ppt (modeled salinity) for the initial discharge and maximum salinities near 40 ppt for continuous discharges. The table below shows the expected hydraulic residence times for this system in the summer. Since the Discharger plans to close the intake structure at pond A17 in the winter (to avoid entraining migrating salmonids) and

may use it as an alternative discharge point, only small flows will discharge from this system during these months.

Table 5A: Initial Stewardship Plan: Average Summer Hydraulic Residence Times for A16

Pond	Area (acres)	Depth (ft)	Volume (acre-ft)	Outlet Flow (ft^3/s)	Residence Time (days)
A17	131	1.2	157.2	13.9	5.7
A16	243	1.7	413.1	12.0	17.35
Complex					23.05

13. ***Alviso System A23***. This system consists of two ponds (Ponds A22 and A23). The Discharger's ROWD mentions this system, but does not request that the Board permit discharges from it at this time.

Baumberg Complex

14. The California Department of Fish and Game owns the Baumberg complex that contains 22 ponds, five separate systems, and comprises about 5,500 acres in Alameda County. The Baumberg Complex only contains evaporator ponds, and the ISP indicates that Cargill historically pumped brines to the Newark or Redwood City plant for crystallization and final processing. Additionally, the ROWD indicates that Baumberg Systems may require active management (i.e., pumping) to control salinity levels since intake culverts may not have sufficient capacity because of the elevation of these ponds relative to the tides to allow adequate flow-through by gravity for salinity control.

15. ***Baumberg System B2***. This system consists of four ponds. The intake pond 1 will receive water from Old Alameda Creek through four new 48-inch gates and through an existing 30,000 gpm pump. The outlet pond 2 will discharge water to the bay (Discharge Point B-2-1) through two new 48-inch gates. The flow in this system will be from Pond 1 to 7 to 4 to 2. In the summer months, the Discharger indicates that it will allow some water to flow directly from 1 to 2. Ponds for which continuous circulation will occur are projected to have maximum salinities of 65 ppt (modeled salinity) for the initial discharge and maximum salinities near 40 ppt for continuous discharges. The tables below shows the expected summer and winter hydraulic residence times for this system.

Table 6A: Initial Stewardship Plan: Average Summer Hydraulic Residence Times for B2

Pond	Area (acres)	Depth (ft)	Volume (acre-ft)	Outlet Flow (ft^3/s)	Residence Time (days)[1]
B1	337	1.2	404.4	39	5.2
B7	209	0.6	125.4	18.9	3.3
B4	175	0.2	35	18.4	1.0
B2	673	1.0	673	36	9.4
Complex	1394				19.0

[1] In calculating summer hydraulic residence times, it is assumed that the Discharger will divert 50% of flows from pond 1 directly to pond 2 and the remaining 50% to pond 7.

Table 6B: Initial Stewardship Plan: Average Winter Hydraulic Residence Times for B2

Pond	Area (acres)	Depth (ft)	Volume (acre-ft)	Outlet Flow (ft^3/s)	Residence Time (days)
B1	337	2.3	775.1	8.5	46
B7	209	1.9	397.1	8.8	22.8
B4	175	1.5	262.5	9.1	14.5
B2	673	2.3	1547.9	10.0	78.0
Complex	1394				161.3

16. ***Baumberg System B2C***. This system consists of eight ponds within one main system that consists of ponds 6, 5, 6C, 4C, 3C, and 2C, and one subsystem that consists of ponds 1C and 5C. The intake pond 6 will receive water from Old Alameda Creek through a new 30,000 gpm pump. The outlet pond 2C will discharge water through two 48-inch gate structures to Alameda Flood Control Channel (Discharge Point B-2C-1). The flow in the main system will be from 6 to 5 to 6C to 4C to 3C and to 2C. The intake pond of the subsystem 1C will receive water from Alameda Flood Control Channel directly downstream of the discharge point 2C through an existing 7,660 gpm pump. The flow in the subsystem will be from 1C to 5C then to 4C of the main system. The ROWD indicates that the Discharger may operate Ponds 5C and 1C as batch ponds with higher salinities to provide habitat for brine shrimp and related species, which may affect discharge salinities from Pond 2C and intake flows at pond 1C. Ponds for which continuous circulation will occur are projected to have maximum salinities of 100 ppt (modeled salinity) for the initial discharge and maximum salinities near 40 ppt for continuous discharges. The tables below shows the expected summer hydraulic residence times for the main and subsystem of B2C. The expected winter hydraulic residence times are not shown as inflows and outflows are expected to be minimal.

Table 7A: Initial Stewardship Plan: Average Summer Hydraulic Residence Times for B2C Main System

Pond	Area (acres)	Depth (ft)	Volume (acre-ft)	Outlet Flow (ft^3/s)	Residence Time (days)[1]
B6	176	2.7	475.2	20.66	11.60
B5	159	1.7	270.3	19.82	6.88
B6C	78	2.2	171.6	19.41	4.46
B4C	175	1.3	227.5	22.94	5.0
B3C	153	1.2	183.6	22.13	4.18
B2C	24	1.3	31.2	22.0	0.72
Complex	942				32.84

[1] In calculating summer hydraulic residence times, it is assumed that pond 6 will accept 80% of the Discharger's intake flow (21.6 ft^3/s).

Table 7B: Initial Stewardship Plan: Average Summer Hydraulic Residence Times for B2C Subsystem

Pond	Area (acres)	Depth (ft)	Volume (acre-ft)	Outlet Flow (ft^3/s)	Residence Time (days)[1]
B1C	66	0.9	59.4	5.05	5.93
B5C	111	1.1	122.1	4.46	13.80
B4C	175	1.3	227.5	22.94	5.0
B3C	153	1.2	183.6	22.13	4.18
B2C	24	1.3	31.2	22.0	0.72
Complex	942				29.63

[1] In calculating summer hydraulic residence times, it is assumed that pond 1C will accept 20% of the Discharger's intake flow (5.4 ft^3/s).

The ISP indicates that there are no salmonid migration concerns for Old Alameda Creek, but there are anadromous fish in Alameda Flood Control Channel. As mentioned above, the ISP indicates that ponds 1C and 5C of the subsystem may be operated as batch ponds with higher salinities to provide habitat for brine shrimp and related species; however, the ISP acknowledges that this would require additional analysis of pond salinities at 2C. The Discharger has not modeled the scenario in which ponds 1C and 5C operate under high salinities. Therefore, this Order includes a provision that requires the Discharger to perform a technical analysis to demonstrate that the discharge from B2C can meet discharge limitations before operating 1C and 5C as batch ponds.

17. ***Baumberg System B6A***. This system consists of three ponds and two control ponds (about one-acre each). The intake pond 8 will receive water through a new 48-inch gate structure from North Creek. The outlet pond 6A will discharge water through a new 48-inch gate to Old Alameda Creek (Discharge Point B-6A-1). There are two routes of flow for this system. One route is from pond 8 (directly or via a control pond) to 6B then to 6A. The second route is from pond 8 via a control pond to 6A. The ISP indicates that the Discharger proposes to operate this system as a seasonal or muted tidal pond system, and therefore, it would not be subject to continuous circulation during the summer months. The ISP explains that the Discharger designed the intake, outlet, and internal connections to provide circulation for filling the pond system in the fall and to empty ponds in the spring. For the model, the ISP indicates that starting conditions assumed that ponds would be empty at the beginning of the rainy season. The ISP indicates these ponds should be transferred dry, and therefore, there will be no initial release from pond 6A to Old Alameda Creek. The maximum salinity from this system should be near 40 ppt for continuous discharges during winter and spring months. The table below shows the minimum emptying times for this system, as the Discharger proposes to operate this system as a seasonal or muted tidal system in the summer.

Table 8A: Initial Stewardship Plan: Minimum Emptying Times for B6A

Pond	Area (acres)	Depth (ft)	Volume (acre-ft)	Outlet Flow (ft^3/s)	Emptying Time (days)[1]
B8	180	0.6	108	13	4.2
B6B	284	0.9	255.6	13	9.9
B6A	340	2.1	714	13	27.7
Complex	804				41.8

[1] In calculating the time to empty this pond system, Board staff assumed that the Discharger would empty ponds at the peak discharge flow. This appears to be consistent with Figure 4-22 of the ISP.

18. ***Baumberg System B8A***. This system consists of six ponds. The intake pond 9 will receive water through 4 new 48-inch gates from Mount Eden Creek. The outlet pond 8A will discharge water through a new 48-inch gate to Old Alameda Creek (Discharge point B-8A-1). Pond 8A will also have the capacity to intake water through a new 48-inch gate from North Creek. During the winter months, the normal route of flow in this system is from 9 to 8A then to Old Alameda Creek. During the summer months, the Discharger will reportedly open the inlet and outlet structures at pond 8A for muted tidal inflow and outflow. The Discharger proposes to control the water levels in pond 9 by fixed weirs between it and 8A. Typically, pond 8A will be dry during the summer months with circulation flow occurring in borrow ditches that comprise about 10% of its area. The ISP indicates that the Discharger did not include ponds 12, 13, and 14 in the continuous model for the system because the Discharger will reportedly operate these ponds as seasonal or batch ponds. The intake pond 8x will receive water through a new 48-inch gate from North Creek and provide additional water to ponds 12, 13, and 14, if the Discharger decides to operate these ponds as batch ponds. Pond 8x is very small and will typically be dry. Ponds for which continuous circulation will occur (i.e., 9 and 8A) are projected to have maximum salinities of 135 ppt (modeled salinity) for the initial discharge and maximum salinities near 40 ppt for continuous discharges. The table below shows the expected hydraulic residence times for this system only for the winter, as the Discharger plans to subject pond 8A to muted tidal flow in the summer.

Table 9A: Initial Stewardship Plan: Average Winter Hydraulic Residence Times for B8A

Pond	Area (acres)	Depth (ft)	Volume (acre-ft)	Outlet Flow (ft^3/s)	Residence Time (days)
B9	356	2.0	712	4.0	89.7
B8A	256	0.5	128	4.0	16.1
Complex	612				105.9

[1] The area of the complex does not include Ponds 12, 13, 14, and 8x (99, 132, 156, and 9 acres) since the Discharger proposes to operate these ponds on a seasonal or batch basis and flows to them are not expected to be significant.

19. ***Baumberg System B11***. This system consists of two ponds and has different operation plans for the initial release and for the summer and winter months of the continuous circulation period. For the initial release, the Discharger proposes to discharge waters to the Bay and operate pond 10 as a muted tidal system. Under the continuous circulation period (summer months), the Discharger intends to operate pond 11 as muted tidal or seasonal pond and have pond 10 intake and discharge waters to the Bay. During the winter, the Discharger proposes to circulate water from pond 10 to 11 then to Mount Eden Creek (Discharge point B-11-1). Ponds in this system are projected to have maximum salinities of 65 ppt (modeled salinity) for the initial discharge and maximum salinities near 40 ppt for continuous discharges. The table below shows the expected hydraulic residence times for this system only for the winter, as the Discharger plans to subject pond 11 to muted tidal flow in the summer.

Table 10A: Initial Stewardship Plan: Average Winter Hydraulic Residence Times for B11

Pond	Area (acres)	Depth (ft)	Volume (acre-ft)	Outlet Flow (ft^3/s)	Residence Time (days)
B10	214	1.6	342.4	11.6	14.9
B11	118	1.1	129.8	12.0	5.5
Complex	332				20.3

Coyote Creek Island Ponds

20. The U.S. Fish and Wildlife Service owns the Coyote Creek ponds. This system consists of three ponds, A19 (265 acres), A20 (63 acres), and A21 (147 acres). The ISP proposes to breach one or more of the levees in each of these ponds to allow full tidal circulation. The Discharger selected the breach locations to avoid the existing railroad bridge at Coyote Creek and to minimize construction within the existing marsh areas along Coyote Creek. The ISP indicates that the breach size proposed was estimated to be consistent with existing studies that show tidal breaches are generally stable provided maximum velocities are in the range of 2.8 to 3.8 ft/s. As velocities for the proposed initial breach size could exceed 4 ft/s, the ISP indicates that it should erode into a more stable configuration over time. The Discharger indicates that the maximum salinity for the initial release will be less than 135 ppt (modeled salinity). At the time of initial release, the maximum depth of water in ponds A19 and A20 will be about 0.5 feet (excluding borrow ditches) and only water in the borrow ditches will remain in pond A21 when breaching occurs. This will allow Bay waters to further dilute salinities before discharge to Coyote Creek occurs. For the tidal circulation with pond breaches, pond salinities will be similar to the ambient high tide salinity in Coyote Creek. With the tidal circulation, the ponds will contain water only at high tide except for borrow ditches.

West Bay Ponds

21. The U.S. Fish and Wildlife Service owns the West Bay ponds, which are part of the larger Redwood City pond complex. The West Bay complex includes five subsystems and seven ponds (1, 2, 3, 4, 5, S5, and SF2) that comprise about 1,600 acres in San Mateo County. The ISP indicates that ponds 1, 2, 3, and SF2 would each operate as independent systems with inlet/outlet structures to allow inflow at high tide and outflow at low tide. The other system would include ponds S5, 5, and 4. The ISP explains that the major inflow and all outflow would be in pond 4 and that a supplemental intake at pond S5 would provide circulation through S5 and 5 then to 4. Since many of the ponds will intake and discharge water at the same location, the ISP indicates that there may be limited mixing within individual ponds. To increase mixing at ponds 1-4, the ISP explains that the Discharger may use the existing Ravenswood pump station. The Discharger indicates that the maximum salinity for the initial release will equal 135 ppt, which is much lower than historical values recorded in these ponds.

Applicable Plans, Policies, and Regulations

22. ***Basin Plan***. The Board adopted a revised Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) on June 21,1995. This updated and consolidated plan represents the Board's master water quality control planning document. The revised Basin Plan was approved by the State Water Resources Control Board (SWRCB) and the Office of Administrative Law on July 20, 1995 and November 13, 1995, respectively. A summary of the regulatory changes is contained in Title 23 of the California Code of Regulations, Section 3912. The Basin Plan identifies beneficial uses and water quality objectives (WQOs) for waters of the state in the Region, including surface waters and groundwaters. The Basin Plan also identifies discharge prohibitions intended to protect beneficial uses. This Order implements the Board's Basin Plan.

23. Existing and potential beneficial uses for South San Francisco Bay and its tributaries, as identified in the Basin Plan and based on known uses of the receiving waters in the vicinity of the discharges, are:

    a. Industrial Service Supply
    b. Navigation
    c. Water Contact Recreation
    d. Non-contact Water Recreation
    e. Commercial and Sport Fishing
    f. Wildlife Habitat
    g. Preservation of Rare and Endangered Species
    h. Fish Migration
    i. Shellfish Harvesting
    j. Fish Spawning
    k. Estuarine Habitat

24. ***California Toxics Rule***. On May 18, 2000, the U.S.EPA published the *Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California* (Federal Register, Volume 65, Number 97, 18 May 2000). These standards are generally referred to as the CTR. The CTR specified water quality criteria (WQC) for numerous pollutants, of which some are applicable to the discharges covered by this Order.

Other Regulatory Bases

25. WQOs/WQC and limitations in this permit are based on the plans, policies and WQOs and criteria of the Basin Plan; California Toxics Rule (Federal Register Volume 65, 97); *Quality Criteria for Water* (U.S. EPA 440/5-86-001, 1986 and subsequent amendments, "U.S. EPA Gold Book"); the National Toxics Rule (57 FR 60848, 22 December 1992 and 40 CFR Part 131.36(b), "NTR"); NTR Amendment (Federal Register Volume 60, Number 86, 4 May 1995, pages 22229-22237); U.S. EPA December 10, 1998 "National Recommended Water Quality Criteria" compilation (Federal Register Vol. 63, No. 237, pp. 68354-68364); "Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California" (Thermal Plan); and Best Professional Judgment (BPJ) as defined in the Basin Plan. Discussion of the specific bases and rationale for limits in this Order are given in the associated Fact Sheet, which is incorporated as part of this Order.

26. ***Basin Plan Receiving Water Salinity Policy***. The Basin Plan states that the salinity characteristics (i.e., freshwater vs. saltwater) of the receiving water shall be considered in determining the applicable WQOs. Freshwater objectives apply to discharges to waters both outside the zone of tidal influence and with salinities lower than 5 parts per thousand (ppt) at least 75 percent of the time. Saltwater objectives shall apply to discharges to waters with salinities greater than 5 ppt at least 75 percent of the time. For discharges to waters with salinities in between the two categories, or tidally influenced freshwaters that support estuarine beneficial uses, the objectives shall be the lower of the salt or freshwater objectives, based on

ambient hardness, for each substance. For constituents with water quality objectives specified in the Basin Plan, it is appropriate to use the Basin Plan definition for determining if the receiving water is fresh, marine, or estuarine.

27. ***CTR Receiving Water Salinity Policy.*** The CTR states that the salinity characteristics (i.e., freshwater vs. saltwater) of the receiving water shall be considered in determining the applicable WQC. Freshwater criteria shall apply to discharges to waters with salinities equal to or less than one ppt at least 95 percent of the time. Saltwater criteria shall apply to discharges to waters with salinities equal to or greater than 10 ppt at least 95 percent of the time in a normal water year. For discharges to water with salinities in between these two categories, or tidally influenced freshwaters that support estuarine beneficial uses, the criteria shall be the lower of the salt or freshwater criteria, (the latter calculated based on ambient hardness), for each substance. In applying CTR criteria it is appropriate to use the CTR definition for determining if the receiving water if fresh, marine, or estuarine.

Receiving Water Salinity and Hardness

28. a. Salinity. The receiving waters for the subject discharge are the waters of South San Francisco Bay (north and south of Dumbarton Bridge), Guadalupe Slough, Alviso Slough, Coyote Creek, Artesian Slough, Alameda Flood Control Channel, Old Alameda Creek, and Mount Eden Creek. These are tidally influenced waterbodies, mostly with significant fresh water inflows during the wet weather season. This Order conservatively assumes that all these water bodies are estuarine under both the Basin Plan and CTR definitions. Therefore, the applicable WQOs and WQC considered in this Order for all these discharges are based on the lower of the marine and freshwater Basin Plan WQOs, and CTR and NTR WQC.

    b. Hardness. Some freshwater WQOs and WQC are hardness dependent. Hardness data collected through the Regional Monitoring Program (RMP) are available for water bodies in the San Francisco Bay Region. In determining the WQOs and WQC for this Order, the Board conservatively used a hardness of 100 mg/L, which is the minimum hardness at the Sunnyvale Station observed from 1993-2000. This Order did not use a separate hardness value for each discharge point, as the value of 100 mg/L is the most conservative, and is protective of all the discharge locations covered by this Order.

Receiving Waters

29. ***South San Francisco Bay***. South San Francisco Bay is a complex and dynamic estuarine system influenced by ocean tides, winds, and freshwater flows. The ROWD explains that currents in South San Francisco Bay are predominately tidal driven and that wind and density driven currents are less important. The salinity levels in South San Francisco Bay are dependent on salinity in the Central Bay and its exchange of water with South San Francisco Bay, freshwater input, and evaporation. Of these three, freshwater input into South San Francisco Bay is the most variable during the year and between different years. Therefore, freshwater input primarily drives salinity variations in South San Francisco Bay.

30. ***Tidal Sloughs near Alviso Ponds***. Tidal sloughs that border the Alviso Ponds include Coyote Creek, Mud Slough, Artesian Slough, Alviso Slough, Guadalupe Slough, Stevens Creek, Mountain View Slough, and Charleston Slough. The ROWD indicates that certain Alviso Pond Systems will discharge to Coyote Creek (A14, A19-A21), Artesian Slough (A16), Alviso Slough (A7), and Guadalupe Slough (A3W).

31. ***Coyote Creek and Artesian Slough***. Coyote Creek is a large tidal slough and a significant source of freshwater to South San Francisco Bay in the winter and spring. Artesian Slough borders ponds A16 and A17 and is a tributary to Coyote Creek. The San Jose/Santa Clara Water Pollution Control Plant (WPCP) discharges an average of 120 million gallons per day (mgd) (~190 ft^3/s) at the upstream end of Artesian Slough. The ISP indicates that Coyote Creek and Artesian Slough both contain strong salinity gradients and frequently contain vertical salinity stratifications. Typically, Coyote Creek is stratified during the winter and Artesian Slough is stratified year round.

32. ***Alviso Slough***. Alviso Slough borders ponds A7-A12 and receives inflows from the Guadalupe River, which is the third largest tributary to South San Francisco Bay in terms of drainage area and flow after Alameda Creek and Coyote Creek. Salinity levels are highly variable in Alviso Slough, but near its mouth are similar to salinity levels at Dumbarton Bridge.

33. ***Guadalupe Slough***. Guadalupe Slough borders ponds A3W, A4, and A5 and receives inflows from Calabazas Creek, Saratoga Creek, and San Tomas Creek. Additionally, the Sunnyvale WPCP discharges about 15 mgd (~23 ft^3/s) to Guadalupe Slough. During the summer and fall, Guadalupe Slough develops a more pronounced salinity gradient with salinities near zero close to the Sunnyvale WPCP discharge and between 10 to 20 ppt at the mouth of Guadalupe Slough.

34. ***Tidal Sloughs near Baumberg***. Tidal sloughs near the Baumberg Ponds include Alameda Flood Control Channel (AFCC, also known as Coyote Hills Slough), Old Alameda Creek, Mount Eden Creek, and North Creek. The ROWD indicates that certain Baumberg Systems will discharge to AFCC (B2C), Old Alameda Creek (B6A, B8A), and Mount Eden Creek (B11).

35. ***Alameda Flood Control Channel***. AFCC receives inflows from Alameda Creek, which is the largest tributary to South San Francisco Bay. At high water, depths in AFCC typically range from 2 to 3 meters, while at low water, depths can be less than one meter. Salinities in AFCC vary from Bay salinity near the mouth to freshwater from Alameda Creek.

36. ***Old Alameda Creek***. Before Alameda Creek flows were diverted to AFCC, they drained to the South Bay through the channel known as Old Alameda Creek. At this time, Old Alameda Creek receives minimal freshwater inflows except during extreme wet weather events. Salinities measured at the Cargill intake location in Old Alameda Creek are similar to South San Francisco Bay salinity. It is divided into two channels: a northern channel and a wider southern channel that are separated by a vegetated bar that may become partially submerged during strong spring tides.

37. ***Mount Eden Creek and North Creek***. Mount Eden Creek and the future North Creek channel will not receive substantial freshwater inflow and are expected to have salinities similar to the Bay. As part of the restoration efforts, the ISP indicates that California Department of Fish & Game will use Mount Eden Creek and North Creek to hydrologically connect the Eden Landing Ecological Preserve to the Bay. Additionally, the ISP indicates that North Creek will provide a restored hydrologic connection between the existing Mount Eden Creek and Old Alameda Creek tidal sloughs.

Overview of Pond Discharges

38. These requirements permit discharge from certain ponds under an initial release scenario where high salinities discharged from certain ponds will likely impact beneficial uses in the short term, but impacted areas are expected to fully recover within one year. These requirements also permit subsequent discharge from these ponds as waters from the south bay are taken into pond systems and then discharged more-or-less continuously (continuous circulation). For the continuous circulation period, the Discharger must manage the pond systems to ensure beneficial uses remain protected. The initial release refers to the time expected to substantially empty salt ponds of their current contents. Modeling performed by the Discharger indicates that the duration of the initial release will be about eight weeks or less. As described in further detail in later findings, it is the position of the Board that the long-term water quality benefits of this project (i.e., maximizing the acreage of salt ponds restored to tidal marsh habitat) outweigh short-term impacts associated with the initial release.

Initial Release

39. There are two types of discharge associated with the ISP: (a) initial release of saline waters already in the ponds, and (b) continuous circulation of water in and out of the ponds. The main parameters of concern for

these discharges include salinity, metals, dissolved oxygen, pH, and temperature. The initial release section focuses on salinity and metals since dissolved oxygen, pH, and temperature will be more of a concern during the late summer months of the continuous circulation period. The initial release is proposed to commence between March 1 and July 1.

40. ***Phase Out Agreement.*** The Phase-Out Agreement (Agreement) by and between Cargill Incorporated, U.S. Fish and Wildlife Service, and the California Department of Fish and Game includes conditions for the transfer of responsibility for operation and maintenance of the salt pond property and property rights acquired by the U.S. Fish and Wildlife Service and the California Department of Fish and Game. This underlying Conveyance Agreement provides for the United States to acquire the Alviso and West Bay Ponds, and for the State of California to acquire the Baumberg and Napa Plant Site. The Agreement states that as a condition precedent to the transfer of responsibility for ponds transferred in a 'wet' condition, the liquid in such ponds must meet the applicable discharge requirements for initial discharge of surface waters from such ponds as set in an Order adopted by the Board. The Agreement includes two categories for transferring ponds: (a) "Wet Transfer Condition" – This means "that the liquid in each such Pond meets the applicable discharge requirements of the RWQCB for initial discharge of surface waters from that pond," and (b) "Dry Transfer Condition" – This means "that the pond is Dry and Cargill has used reasonable efforts to remove substantially all of the liquid from the surface and from borrow ditches, including the use of portable pumps where necessary." In order to facilitate the timely implementation of the project, Cargill and the Discharger set forth in the Agreement to work with the Board to establish the discharge requirements by March 2004. For the purposes of the Agreement, the Board's discharge requirements for the transfer of "wet" ponds, or the "Wet Transfer Condition," equals the initial release instantaneous salinity limits specified in Discharge Limitations B.1.

41. ***Hydrological Modeling***. To determine the spatial extent and duration of salinity and metals increases under various planning scenarios, the Discharger performed hydraulic modeling to predict salinity and water elevation changes under ISP conditions. The model used recorded tides, evaporation, and rainfall for the period from spring 1994 through the fall of 1995, which was a dry year and meant to illustrate a worst-case scenario.

42. ***Scenarios for Initial Release***. The initial release from certain salt ponds has the potential to cause certain receiving waters to exceed water quality objectives for arsenic, nickel, mercury, and salinity. To document the magnitude, duration, and spatiality of these exceedances the Discharger's Environmental Impact Report (EIR) describes modeling results from two different release scenarios:

    a. The first scenario involves the discharging from nine of the pond systems (i.e., Alviso A2W, A3W, A7, A14, A16 and Baumberg 2, 2C, 8A, and 11) on April 1 at salinities proposed in Table 11.
    b. The second scenario involves a phased initial release. The Discharger would release waters from six of the ponds (Alviso A2W, A3W, and A7 and Baumberg 2, 8A, and 11) at the salinities indicated in Table 11 on July 1 and the remaining ponds the following March/April.

43. ***Maximum Salinities for Initial Release***. In developing salinity standards for the initial release, the Discharger indicates that ponds will not contain salinity levels above 135 ppt since gypsum (calcium sulfate) begins to precipitate in water with salinities above 146 ppt. As calcium sulfate does not readily dissolve in water and the precipitation of which may cause the toxicity of saline waters above this threshold to increase significantly, the Discharger needs to ensure that salinity levels remain below this level. Modeling studies demonstrate that the Discharger has minimized the effect of the initial release on aquatic life by iteratively locating discharge points to maximize mixing with receiving waters, timing the release to minimize the effect of salinity increases on sensitive species, and shown that salinity increases outside the initial zone of mixing have been minimized to protect aquatic life. To ensure that the effect of the initial release is consistent with

those presented in the ROWD, this Order includes constraints on the timing of the initial release from pond systems and contains salinity limits that are equal to or lower than those modeled.

44. ***Salinity as a Surrogate for Metals***. If only evaporation affected metals concentrations, they would increase proportionately with salinity. However, other factors within the ponds such as biological uptake and adsorption to fine sediments will reduce metals concentrations. Accordingly, using salinity as a surrogate for metals concentrations should be more protective, as it will only consider evaporation, which is the mechanism by which metals concentrations increase. Besides offering more protection, the use of salinity will give the Discharger immediate feedback on conditions at discharge points and within pond systems, and thereby, enable it to implement corrective measures in a timely manner based on monitoring results.

45. ***Salinity and Metals Concentrations for Initial Release.*** To determine expected metals concentrations for different salinity ranges, the Discharger (a) collected samples from the salt ponds in October 2002 along a salinity gradient (salinities ranged from 31.6 to 279 ppt), and (b) used RMP data from the South Bay and Dumbarton Bridge (salinities ranged from 12 to 20 ppt). The tables below show the modeled salinity in ppt for each pond system and the corresponding estimated maximum metals concentration in µg/L (except for mercury which is in ng/L). Metal concentrations in the discharge that are expected to exceed the minimum applicable receiving water quality objective or criterion are shown in italics.

Table 11A: Proposed Maximum Salinities and Metals for Initial Discharge from Alviso Ponds

Pond System	Modeled Salinity	Cr	Ni	Cu	Zn	As	Se	Ag	Cd	Hg	Pb
A2W, A3W	65	2.36	15.7	2.15	3.07	15.7	0.27	0.03	0.063	32	0.84
A7, A14	100[2]	2.36	18.1	2.15	3.38	20.1	0.27	0.15	0.063	44.5	0.84
A16, A19-21	135	2.36	21.8	3.39	4.49	*56.2*	0.31	0.15	0.119	49.7	1.37
WQO[1]		11.4	27	13	86	36	5.0	2.2	0.27	50	3.2

[1] The water quality objectives south of Dumbarton Bridge apply to discharges from the Alviso Ponds. The water quality objectives for chromium, cadmium, and lead are freshwater driven and based on a hardness of 100 mg/L. The initial release of highly saline waters from Alviso Ponds will cause some receiving waters to contain salinity and arsenic in excess of water quality objectives for a short duration.

[2] The modeled salinity used for pond system A7 was 110 ppt.

Table 11B: Proposed Maximum Salinities and Metals for Initial Discharge from Baumberg Ponds

Pond System	Modeled Salinity	Cr	Ni	Cu	Zn	As	Se	Ag	Cd	Hg	Pb
B2, B11	65	2.36	15.7	2.15	3.07	15.7	0.27	0.03	0.063	*32*	0.84
B2C	100	2.36	*18.1*	2.15	3.38	20.1	0.27	0.15	0.063	*44.5*	0.84
B8A	135	2.36	*21.8*	3.39	4.49	*56.2*	0.31	0.15	0.119	*49.7*	1.37
WQO[1]		11.4	16.3	4.6	58	36	5.0	2.3	0.27	25	3.2

[1] The water quality objectives north of Dumbarton Bridge apply to discharges from the Baumberg Ponds. The water quality objectives for chromium, cadmium, and lead are freshwater driven and based on a hardness of 100 mg/L. As the Discharger performed site-specific translators for copper and nickel, the values shown in Table 11B represent site-specific water quality objectives. The initial release of highly saline waters from Baumberg Ponds will cause some receiving waters to contain salinity, nickel, arsenic, and mercury in excess of water quality objectives for a short duration.

46. ***Salinity Increases and the Initial Release***. In determining the significance of salinity increases from the initial release, the Discharger's EIR used two thresholds: a) the magnitude of salinity increases, and b) the spatial extent of those increases. To determine the level of salinities that would likely result in a significant

impact, the EIR developed levels that were likely to cause acute or chronic effects on aquatic life (these levels are described in detail in the Fact Sheet). The EIR concluded that significant acute effects would likely occur if salinities exceeded 41 ppt for 2 hours and that significant chronic effects would likely occur if salinities exceeded 38 ppt for 24 hours. It also concluded that potentially significant acute effects might occur if salinities exceeded 38 ppt for 2 hours and that potentially significant chronic effects might occur if salinities exceeded 35 ppt for 24 hours. The EIR considered acute and chronic effects to be significant or potentially significant, if pond waters would result in more than 10% of a receiving water exceeding these criteria. For the initial release period, the EIR indicates that at modeled salinity values significant impacts would likely occur in Old Alameda Creek and Alameda Flood Control Channel, and that potentially significant impacts might occur in Alviso Slough. The EIR did not predict significant impacts to the remaining receiving waters (Bay, Guadalupe Slough, Coyote Creek, and Artesian Slough) during the initial release.

47. ***Metals Increases during the Initial Release.*** During the initial release, salt ponds may contain concentrations of nickel, mercury, and arsenic above water quality objectives. To determine if pond discharges would cause receiving waters to be above water quality objectives, the Discharger performed dynamic modeling (spatial resolution of 200 m^2 in the Bay, and 15 to ~25 m^2 in the sloughs). This showed that during the initial release, pond discharges might cause some exceedances for mercury in AFCC and Old Alameda Creek (based on a one-dimensional model because of its small size), but none for arsenic or nickel (when using the nickel site-specific translator). For mercury, the ROWD indicates that based on average receiving water concentrations, it expects one segment of AFCC to be above water quality objectives, but explains that the magnitude of the increase will be small and the duration short-lived.

48. ***Calculation of Discharge Limits for Initial Release.*** In estimating maximum salinities for the initial release, the Discharger considered salinity values from each pond for the whole calendar year. However, this Order requires that the initial release occur in the spring or early summer (depending on the pond system) to maximize the assimilative capacity of receiving waters. To develop limits for the initial release, Board staff calculated performance-based limits for the seasonal period of discharge, addressed increasing salinities in certain pond systems by performing a trend analysis, and evaluated the expected water quality impacts based on dynamic modeling. Because salinity levels lower than those modeled by the Discharger for the initial release are technically achievable and/or necessary to minimize water quality impacts, this Order includes more restrictive salinity limits during the initial release for discharges to Old Alameda Creek, Guadalupe Slough, and Alviso Slough. The Fact Sheet contains supporting documentation for the a) calculation of initial release limits, and b) conclusion that these limits minimize water quality impacts to the maximum extent practicable. Table 12 below includes the pond system, receiving water, modeled values, and initial release limits.

Table 12: Salinity Initial Release Limits from each Pond System

Pond System	Receiving Water	Modeled Values (ppt)	Limit (ppt)[1]
A2W	Bay	65	60
A3W	Guadalupe Slough	65	50
A7	Alviso Slough	110	90
A14	Coyote Creek	100	100
A16	Artesian Slough	135	135
A19-A21	Coyote Creek	135	135
B2	Bay	65	65
B2C	AFCC	100	100
B6A	Old Alameda Creek	Dry	65
B8A	Old Alameda Creek	135	65

Pond System	Receiving Water	Modeled Values (ppt)	Limit (ppt)[1]
B11	Bay	65	65
West Bay Ponds	Bay/Ravenswood Slough	135	135

[1] For Pond Systems B6A the transfer standard is "dry", as defined in Finding 40. Discharges of liquid brine for the initial release may be as high as 65 ppt from this system. For pond system B8A, the transfer standard is dry or 65 ppt. For Ponds A19-A21, the transfer standard of 135 ppt is contingent upon Cargill lowering water levels to the maximum extent practicable.

49. ***Metals and Salinity Increases from West Bay Ponds.*** To evaluate the potential for metals increases in receiving waters during the initial release, and to verify that during the continuous circulation period a salinity limit of 44 ppt will not impact receiving waters or cause metals to exceed Basin Plan objectives, this Order requires the Discharger to complete a technical evaluation, as described in Provision D.5. This is because preliminary modeling by the Discharger a) did not evaluate metals increases, and b) indicates that for the contemplated pond systems, during the continuous circulation period there is a potential for salinity to cause significant impacts in Ravenswood Slough during the late summer.

50. ***Timing of Initial Release.*** During the late summer and early fall, the salinity levels in South San Francisco Bay are near uniform and may be close to oceanic (31-33 ppt). This is because freshwater inputs to South San Francisco Bay during the summer months are almost exclusively from wastewater treatment plants and evaporation nearly offsets these inputs. In the winter months, salinity levels in South San Francisco Bay are often stratified and variable due to large freshwater inputs and the resulting density-driven exchange between the Central Bay and South San Francisco Bay. The ROWD includes the variability of salinities measured by USGS in the main channel of South San Francisco Bay between 1988 and 2000. This shows that the lower salinity values typically occur between February and April. As the discharge of high salinity waters from certain ponds has the potential to cause salinity increases that may be toxic to aquatic life, it is appropriate to require relatively higher salinity discharges during a time-period that has the smallest potential to adversely affect aquatic life in the Bay. The ISP indicates that April was proposed for most of the initial releases since it would (a) take advantage of higher assimilative capacity for saline waters, (b) avoid upstream migration of steelhead trout and Chinook salmon (Finding No. 51), (c) be near the end of the juvenile salmonids migration period (Finding No. 51), and (d) be during the period when few bay shrimp are present (Finding No. 52). Therefore, from the sole perspective of protecting water quality, the initial release of salt pond waters should occur in early April. However, there are other factors to consider in terms of optimizing the timing for the initial release. Construction of inlet, internal, and outlet structures may enable the Discharger to release salt waters from certain pond systems (i.e., A2W, A3W, A7, B2, and B11) by July 2004. Dynamic modeling results provided by the Discharger indicate that similar increases in receiving water salinity should occur whether these systems discharge in April or July. In permitting a July release from these ponds a balance was established between a) the potential for a low rainfall winter that could cause higher salinity for a discharge the following April, and b) the operation and maintenance necessary to maintain salinity at current levels (as indicated in Attachment 1, ponds A2W and A7 are experiencing an upward salinity creep). For these reasons, this Order provides the Discharger with more flexibility for the timing of the initial release of salt pond waters from pond systems A2W, A3W, A7, B2, and B11.

51. ***Migration of Salmonids.*** The ROWD indicates that steelhead trout and Chinook salmon migrate in areas in the South Bay and sloughs that will receive pond discharges. The ROWD also indicates that salt pond discharges will not affect spawning areas for both of these species. Specifically, the ROWD indicates that Coyote Creek and Alviso Slough contain steelhead trout and Chinook salmon for certain portions of the year, and that a steelhead trout run may be restored in Alameda Flood Control Channel. The table below describes the upstream and downstream migration periods when saline waters have the potential to affect migrating salmonids.

Table 13: Migration Periods for Salmonids

Species	Upstream Migration	Downstream Migration
Steelhead Trout	January-March	March-April[1]
Chinook Salmon	September-November	March-April[1]

[1] Steelhead Trout and Chinook Salmon primarily migrate downstream in March and April, but storm induced migrations can begin as early as December. For this reason, NMFS recommends that the Discharger close intakes on all salmonids creeks and sloughs from December through April.

52. ***Bay Shrimp***. Bay shrimp are present in the South Bay and adjoining tributaries and sloughs throughout the entire year. The density and age structure of the bay shrimp population exhibits considerable temporal variability. The ROWD indicates that the amount of bay shrimp in the main channel of the South Bay (the prime fishing area) varies considerably over the course of a year, with the high point occurring in September and October and the low point occurring in March and April. To minimize potential impacts to bay shrimp, this Order requires that the initial release from high salinity systems commence in the March/April time-period.

53. ***Initial Release and Recovery***. During the initial release, pond waters may adversely affect aquatic life in zones near discharge points. The ROWD explains that such effects will be short-lived and that the aquatic community will recover quickly. It indicates that benthic communities adversely affected by the initial release should completely recover within one year. To support this position, the ROWD cites studies that describe quick recovery times for benthic communities subject to perturbations that significantly reduced their numbers. The Fact Sheet summarizes a number of these studies and describes the effect of the initial release on benthic communities in more detail.

Restoration to Tidal Marsh and Timely Cessation of Salt Operations

54. ***Restoration and timely cessation of salt operations outweighs short-term exceedances***. Restoring tidal wetland functions to salt ponds will improve water quality in the South San Francisco Bay Estuary on a spatially significant scale with large contiguous habitat, maximized ecotonal or edge habitat, and minimized non-native vegetation. Marsh systems tidally connected to the estuary improve water quality and beneficial uses by filtering and fixing pollutants, providing nursery habitat and protection from predation for native fish species, providing significant biological productivity to the estuarine system, and providing habitat for rare and endangered species. The finding of net environmental benefit relevant to water quality and beneficial uses is therefore predicated on the assumption that tidal marsh restoration in the permitted area is maximized within the constraints of ecologically beneficial habitat goals for migratory birds and all terrestrial and aquatic life dependent on high quality of the waters of the state in the permitted area. These constraints include seasonal migration of salmonid fish species, flood management requirements, existing infrastructure for energy and transportation, and the need to phase restoration carefully over time to avoid displacement of significant quantities of organisms adapted to the existing saline pond habitats along the salinity gradient of 15 to 150 ppt. The finding of net environmental benefit is also based on timely cessation of salt-making operations and the avoidance of the negative consequences of project delays on buildup of salt in the former salt ponds and the associated water quality risks and management costs, as experienced by the dischargers with the North Bay salt ponds.

55. ***Mudflats***. In restoring the south bay salt ponds to tidal marsh, the Discharger needs to resolve the disparity between the sediment demand of subsided salt ponds and the available sediment supply. There is a concern that restoration of the salt ponds could result in significant erosion of ecologically important mudflats. This is because natural processes (e.g., windy conditions) resuspend and redistribute sediment from mudflats creating high sediment concentrations in the water column. At this time, these sediments redeposit on mudflats; however, restoration of the salt ponds could result in the transport of some sediment to restoration sites instead of mudflats.

56. ***Time Frame for Restoration***. In order to meet the sediment deficit without scouring mudflats, the Discharger will either (a) phase restoration over many decades to match sediment demand with the rate at which sediment naturally enters the South Bay (estimated annually at about 0.9 million cubic yards), or (b) partially fill ponds with clean dredged sediments. The Restoration Report (defined in Finding No. 65) estimates that to restore two-thirds of the South Salt Pond complex the first option could take about 99 years and the second option could take about 39 years.

57. ***Restoration Work Plan***. This Order allows short-term exceedances of water quality objectives, because the Discharger will restore salt ponds to tidal marsh habitat to demonstrate a net water quality benefit as described in Finding No. 54. As such, the Discharger needs to develop a work plan that describes the time frame and spatial extent of tidal marsh restoration, and how it will demonstrate a net water quality benefit.

Continuous Circulation Period

58. After the eight week period of initial release, Bay waters will be taken into pond systems and discharged based on tidal flows, and where necessary via auxiliary pumps to meet discharge limitations. The continuous circulation period refers to the long-term operation of pond systems after the initial release, and until the beginning of the long-term restoration project. The continuous circulation period will be at least five years for all ponds and longer for some. As ponds will concentrate waters from the Bay and/or Sloughs, the main concern with discharges from these systems is for pollutants that have the potential to adversely affect aquatic life. The main parameters of concern for the continuous circulation period include salinity, metals, dissolved oxygen, pH, and temperature.

59. ***Design and Operation of Water Control Structures for Continuous Circulation.*** After the initial release of brines, the Discharger proposes to operate ponds to limit salinity discharges to 40 ppt. The ROWD indicates that intake and discharge structures were designed to provide adequate circulation and water quality control, in part, by ensuring salinity levels remain below 40 ppt for a summer after a low rainfall winter. The ROWD indicates that for some systems control structures were designed to offer the flexibility to close, allow inflow only, allow outflow only, and the ability to reverse the direction of inflows and outflows when necessary to control salinity and/or water levels. All intakes of Bay water into the pond systems will occur at high tide and all discharges will occur at low tide. While the Discharger designed pond systems to ensure that salinity levels remain below 40 ppt, it modeled salinity levels near 44 ppt to be conservative. The Discharger based pond operations described in its ROWD on modeling results. As such, the Discharger indicates that it may need to modify pond operations based on the results of wildlife and water quality monitoring.

60. ***Salinity Increases from Continuous Circulation***. To evaluate potential impacts to receiving waters from increases in salinity, the Discharger used hydrodynamic modeling and the criteria it developed for determining impacts during the initial release (described in Finding No. 46). In this evaluation, the Discharger showed that continuous circulation of pond waters would not cause any significant or potentially significant impacts to any receiving waters. The Fact Sheet describes the rationale of this conclusion for each pond system in detail.

61. ***Metals Concentrations during Continuous Circulation.*** During the continuous circulation period, metals concentrations in the discharge should not exceed applicable water quality objectives provided the Discharger operates each pond system to maintain salinities below 44 ppt. The tables below show the estimated maximum salinity of 44 ppt for each pond system and the corresponding estimated maximum metals concentration in μg/L (except for mercury which is in ng/L). This indicates that during continuous discharges from the Alviso and Baumberg Systems water quality objectives for metals will be met.

Table 14A: Estimated Maximum Salinities and Metals Levels for Continuous Circulation from the Alviso System[1]

Maximum Salinity	Cr	Ni	Cu	Zn	As	Se	Ag	Cd	Hg	Pb
44	1.22	8.05	2.98	1.83	10.7	0.4	0.012	0.078	1.8	0.307
WQO[2]	11.4	27	13	86	36	5.0	2.2	0.27	50	3.2

1 To estimate the maximum metals concentrations from the Alviso System for continuous discharges, the ROWD considered an average of RMP data from 1997-1999 at the South Bay Station and salt ponds with salinities of 31.6 and 42 ppt.

2 The Basin Plan only specifies water quality objectives south of Dumbarton Bridge for copper and nickel. For the other inorganics, water quality objectives are from the California Toxics Rule. Since the Board must express limits for metals in the total recoverable form, Board staff used default translators to convert dissolved water quality objectives to total. The water quality objectives for chromium, cadmium, and lead are freshwater driven and based on a hardness of 100 mg/L as $CaCO_3$, which is the lowest value found in sloughs (in this case Guadalupe Slough) monitored near the discharge in the Regional Monitoring Program.

Table 14B: Estimated Maximum Salinities and Metals Levels for Continuous Circulation from the Baumberg System[1]

Maximum Salinity	Cr	Ni	Cu	Zn	As	Se	Ag	Cd	Hg	Pb
44	3.67	11.8	4.27	5.48	11.9	0.36	0.022	0.098	16	0.843
WQO[2]	11.4	16.3	4.6	58	36	5.0	2.3	0.27	25	3.2

1 To estimate the maximum metals concentrations for the Baumberg System for continuous discharges, the ROWD considered an average of RMP data from 1997-1999 at the Dumbarton Bridge Station and salt ponds with salinities of 31.6 and 42 ppt.

2 These Basin Plan water quality objectives apply for waters north of Dumbarton Bridge except for copper, which is from the California Toxics Rule. This is because the Basin Plan does not specify a saltwater objective for copper. The Discharger performed site-specific translators for copper and nickel. Therefore, the values shown in Table 14B represent site-specific water quality objectives.

62. ***Continuous Circulation Salinities and Aquatic Life***. The ROWD indicates that with ponds discharging at estimated maximum salinities, the resulting salinity levels in receiving waters are unlikely to exceed tolerance levels of most fish and invertebrates under continuous circulation periods. The Discharger's EIR supports this position by documenting the magnitude and spatial scale of salinity increases and by showing that these increases are unlikely to adversely affect aquatic organisms. The Fact Sheet describes the results of this analysis in more detail. The ROWD also explains that under existing conditions, tidal cycles and rainfall cause salinity levels in receiving waters to vary considerably, and that the discharge salt pond water will tend to narrow the daily salinity range primarily by increasing daily minimum values.

63. ***Measures to Protect Downstream Migrating Salmonids during Continuous Circulation***. To avoid entrainment of juvenile salmonids, the ROWD indicates that the Discharger will close intake structures at selected locations (i.e., A9, A17, and B1C) during peak migration periods. Additionally, the ROWD explains that one concern with the circulation of pond water was that it could potentially interfere with the signal migrating salmonids follow to reach their spawning grounds. To address this concern, the ROWD indicates that the Discharger performed 3-dimensional modeling to show that "natal-stream water" gradients will remain intact in migration corridors during upstream migration periods. This modeling effort also indicates that under a worst-case scenario (late summer of a dry year) migration corridors should still contain about two-thirds of their natal stream water. To ensure that ponds will not entrain outmigrating juvenile salmonids, this Order prohibits the intake of water at ponds A9, A17, and B1C from December through April.

64. ***Salinity and Metals Limits for Continuous Circulation***. Modeling performed by the Discharger indicates that, provided salinities remain below 44 ppt, salinity levels will not adversely affect receiving waters.

Additionally, analytical data shows that ponds with salinity levels below 44 ppt should result in discharges of metals that do not exceed water quality objectives. To ensure that salinity levels from each pond system discharge do not pose a threat to aquatic life, the Discharger will operate pond systems in a manner that ensures the maximum discharge salinity does not exceed 44 ppt. Since this Order uses salinity as a surrogate to regulate the concentrations of metals discharged, the Discharger needs to ensure through monitoring that evaporation does not concentrate metals to a point where they could be toxic to aquatic life. Accordingly, this Order includes monitoring for salinity and metals to ensure the Discharger has data to adaptively manage each pond system. This will ensure corrective measures if increases in salinity and metals concentrations from evaporation pose a threat to water quality. If self-monitoring data shows that the salinity limitations do not offer adequate protection, this Order will be reopened.

65. ***Dissolved Oxygen and pH.*** In lower salinity ponds, dissolved oxygen and pH may present water quality concerns. Studies of salt ponds conducted in the 1980s[1] indicate that dissolved oxygen concentrations in low salinity ponds (less than 30 ppt) have ranged from 1.4 to 20.0 mg/L and that pH levels in these ponds have ranged from 7.2 and 9.5. Observed low dissolved oxygen levels and high pH values in low salinity ponds are likely a result of excessive algal growth. According to the Restoration Report, these low salinity ponds are likely conducive to algal growth because (a) more algal species can tolerate salinities in this range, and (b) they tend to have elevated nitrogen and phosphorus concentrations from local urban sources, and warm temperatures.

[1] A report by Stuart Siegel and Philip Bachand: *Feasibility Analysis: South Bay Salt Ponds Restoration* (referred to in this Order as Restoration Report) cites two studies conducted in the 1980s: *The Causes and Control of Hydrogen Sulfide Emissions in the Leslie Salt Company Alviso Evaporation Ponds* and *Algal Proliferation in Salt Ponds of South San Francisco Bay.*

66. ***Diurnal Variations in Dissolved Oxygen, and pH.*** Algal growth in salt ponds could cause dissolved oxygen and pH levels to vary significantly over the course of a day. This is because during daylight hours, photosynthesis will produce oxygen and consume dissolved carbon dioxide (which behaves similar to carbonic acid). During nighttime hours, respiration will produce dissolved carbon dioxide and consume oxygen. Therefore, any significant algal growth will cause dissolved oxygen and pH levels to peak during the late afternoon and to be at their lowest levels in pre-dawn. As mentioned in the previous finding, studies conducted in the 1980s indicate that dissolved oxygen and pH values could be at levels of concern . To determine the diurnal and spatial variation of dissolved oxygen and pH levels in low salinity ponds, the Discharger collected a number of samples from ponds A2E, A3W, B2, B4, and A13. These results showed a diurnal variation in dissolved oxygen, but not pH. Table 15 below summarizes these results (the Fact Sheet describes them in more detail).

Table 15: Dissolved Oxygen and pH Ranges

Pond	Salinity	Dissolved Oxygen Range at Dawn (mg/L)	pH Range
A2E	32.9	2.9 to 9.2	9.68 to 10.03
A3W	40.8	4.3 to 5.5	9.47 to 9.68
B2	39.3	3.8 to 5.9	8.07 to 8.27
B4	42.0	0.3 to 5.4	8.44 to 9.04
A13	63.3	2.5 to 3.4	8.47 to 8.57

The above results indicate that some pond waters may not meet the receiving water objectives in the Basin Plan of 5.0 mg/L for dissolved oxygen, and 6.5 to 8.5 for pH at the discharge point. However, it is difficult to collect data that will be fully representative of continuous circulation discharges for these parameters. This is because the amount of algal growth will relate to how quickly bay waters flow through pond systems. To address potential exceedances of receiving water objectives in the Basin Plan for dissolved oxygen and pH, this Order requires that the Discharger documents in its Operation Plan how it will ensure that mitigation measures can be readily implemented (e.g., increasing flow through, installing portable aerators, harvesting algae, and/or temporarily ceasing discharge).

67. ***Temperature***. Due to shallow water depths and limited tidal exchange, water temperature in the salt ponds is elevated and varies widely throughout the day. Annual water temperatures within the ponds generally range from 40 to 80°F and generally track with air temperature. The State's Thermal Plan indicates that discharges shall not exceed the natural temperature of receiving waters by 20°F, and discharges shall not cause temperatures to rise greater than 4°F above the natural temperature of the receiving water at any time or place. The ROWD indicates that temperatures collected in the salt ponds on August 26 and 27, 2002, showed values ranging from 19.5 to 32.8°C (67.1 to 91.0°F), and values in the Bay ranging from 26.7 and 28.1°C (80.1 to 82.6 °F). These results indicate that salt pond discharges should comply with the Thermal Plan.

68. ***Dissolved Oxygen, pH, and Temperature Limits***. As the pond systems are of shallow depth (one to three feet), near WPCP outfalls, and will be subject to significant heating and potentially excessive algal growth in the late summer months, the Discharger needs to ensure that pond circulations are adequate to comply with Basin Plan objectives for pH, dissolved oxygen, and temperature. Compliance with these limits may be dependent on a number of factors beyond the Discharger's control (strength of tides, rainfall, and temperature). Therefore, this Order requires that the Discharger implement corrective measures (e.g., increase flow-through rates, daily restrictions on discharge, and/or aeration) if monitoring data suggests that salt pond discharges have the potential to adversely affect receiving waters. To ensure that dissolved oxygen levels in the receiving water are not adversely affected, this Order requires that discharges contain at least 5 mg/L of dissolved oxygen or that the Discharger document that dissolved oxygen levels will not further depress those in the receiving water. For pH, this Order requires that discharges contain a level between 6.5 and 8.5 or that the Discharger document that receiving waters near the point of discharge meet this limit. For temperature, this Order requires that discharges comply with the State's Thermal Plan (i.e., discharges shall not exceed the natural temperature of receiving waters by 20°F and shall not cause temperatures to rise greater than 4°F above the natural temperature of the receiving water at any time or place). The Fact Sheet discusses the rationale for dissolved oxygen and pH limits in further detail.

69. ***Toxic Organic Pollutants***. To evaluate the potential for toxic organic pollutants to be present, the Discharger sampled five ponds with salinities ranging from 16 to 185 ppt. The results showed that only one pollutant (bis(2-ethylhexyl) phthalate) was detected at a trace level (1.93 μg/L) that could not be quantified. The ROWD also indicates that dioxins and furans were analyzed from three ponds, and were nondetect or found at concentrations below the method calibration limit. For the most restrictive toxic organic pollutants, the primary concern is the mass discharged, as their water quality objectives are driven by bioaccumulation in aquatic organisms. Since ponds will be circulating waters from the Bay or sloughs, the mass of toxic organic pollutants discharged will be the same as that taken in by the ponds.

Sediments

70. ***Summary of Sediment Data***. Based on sediment data collected by the Discharger, this Order concludes that pollutants have not accumulated in the Alviso, Baumberg, and West Bay salt ponds to levels that (a) exceed ambient conditions in the Bay, and (b) pose a threat to wildlife. Findings 71-82 provide the basis for this conclusion.

71. ***Collection of Pond Sediment Samples.*** The ISP indicates that most salt ponds were constructed in the early 1900s and that some of the Alviso Ponds (A1 through A7) were constructed in the late 1940s. Once the salt ponds were diked, input sources have almost exclusively been limited to intake water from the Bay (Ponds A5, A7, and A8 are subject to certain flooding events from the Guadalupe River, and therefore, could receive

contaminants from floodwaters). To determine if salt ponds have accumulated pollutants, the Discharger collected samples for inorganics and toxic organic pollutants from several ponds. The Discharger focused its sampling effort on inorganics (in particular mercury due to historical mining activities in the Coastal Range and Guadalupe River watersheds), as these pollutants have the potential to adversely affect aquatic life and/or wildlife if new pond management strategies cause them to become more available.

72. ***Screening Values***. To determine if sediments in salt ponds contain elevated levels of inorganics, the Discharger compared available sediment data with screening values. Screening values include: San Francisco Bay Ambient Values developed by the Board in 1998, Effects Range-Low (ER-L) and Effects Range-Median (ER-M) toxicity based thresholds developed by the National Oceanic and Atmospheric Administration (NOAA) in 1995, and ambient data from the Guadalupe River and other areas near the ISP ponds.

73. ***Ambient Levels***. A Board staff report entitled *Ambient Concentrations of Toxic Chemicals in San Francisco Bay Sediments* (hereafter Sediment Report) summarizes ambient concentrations of chemical compounds found in San Francisco Bay sediments. It recommends setting the ambient threshold at the 85th percentile and explains that sediment concentrations above this threshold would be considered evidence of contamination. In developing the ambient threshold, the Sediment Report explains that (a) samples were collected in the upper 5 cm at sampling stations away from point and nonpoint sources of pollution to represent the cleanest sediments in the Bay, (b) a statistical approach was used to remove outliers, and (c) the 85th percentile was established with a 95% confidence level.

74. The Sediment Report indicates that establishing background conditions for metals was difficult, as the concentration of metals in the sediment was dependent upon grain size. Additionally, the Sediment Report explains that the relationship between chemical concentration of metals and percent fines is a complex function of differences in surface area, ion exchange capacity, organic carbon content, and minerology. To account for different background concentrations based on grain size, the Sediment Report established two bounds: one for 40% fines and one for 100% fines for coarse grain and fine grain sediments. The ROWD indicates that for wetland and floodplain environments, natural sedimentation predominately involves fine-grained sediments, and therefore, it compared the concentrations of pollutants in pond sediments with the background concentrations established for 100% fines.

75. The Sediment Report indicates that there would be little environmental benefit to insist that sediment concentrations in a restored wetland fall below ambient concentrations, as the new marsh substrate will be comprised of sediment deposited by re-suspension from surrounding sources.

76. The National Oceanic and Atmospheric Administration (NOAA) published effect-ranges that relate to potential toxic effects of pollutants. The cutoff points corresponding to the effect ranges are the low (ER-L) and median (ER-M). NOAA calculated these values by examining a range of chemical concentrations associated with adverse biological affects. Further, the ER-L values represent the lower 10th percentile concentration of the data, and that concentrations near this value should rarely cause adverse biological effects, while the ER-M values represent the 50th percentile of the data and that concentrations above this value are likely to cause adverse biological effects.

77. ***Sediment Data***: The ISP provided sediment data in five summation tables based on the entity that performed sampling. As one of the main concerns with the salt ponds is that mercury might be have accumulated in the Alviso Ponds because of historic mining activities in the Guadalupe River watershed, the Discharger focused its sediment sampling efforts in this area. In total, the Discharger collected 31 metal samples from the Alviso Ponds, four from the Baumberg Ponds, and one from the West Bay Ponds.

78. ***Data Evaluation***: As mercury is the only pollutant that is expected to differ significantly in the pond systems, the Board considered two separate data sets for mercury: one from the Alviso Ponds and one from the Baumberg and West Bay Ponds. To evaluate the remaining inorganics, the Board considered them as one data set.

79. ***Inorganics***: In analyzing inorganics (except mercury), the Board compared the mean of all pond values (if normally distributed) or the median (if nonparametric) to ambient values contained in the Sediment Report and to the ER-L values published by NOAA. Table 16 below summarizes the results of this analysis:

Table 16: Summary of Inorganics in Salt Ponds and Screening Levels

Constituent[1]	Salt Pond Value[2]	Ambient	ER-Low	Above Ambient and ER-Low?
Arsenic	9.6	15.3	8.2	No
Cadmium	0.36	0.33	1.2	No
Chromium	93	112	81	No
Copper	35.3	68.1	34	No
Lead	28.4	43.2	46.7	No
Nickel	94.9	112	20.9	No
Selenium	0.59	0.64	N/A	No
Silver	0.18	0.58	1	No
Zinc	90.9	158	150	No

[1] Data sets for arsenic, chromium, copper, lead, and zinc fit a normal distribution, whereas data sets for cadmium, nickel, selenium, and silver were nonparametric. Accordingly, the salt pond value for normally distributed parameters is the mean and the salt pond value for nonparametric parameters is the median.
[2] These are mean or median values in mg/kg dry weight based on all data that met quality assurance/quality control requirements in the Discharger's Report of Waste Discharge.

As shown in the Table 16, cadmium is the only constituent that exceeded ambient levels in the Bay. To determine if the cadmium levels in the salt ponds could pose a threat to wildlife, the Board compared salt pond values with the ER-L value published by NOAA. Based on this, the Board determines that cadmium is not at a level of concern, nor are the remaining metals described in Table 16. While selenium levels are below ambient, the Discharger will collect additional baseline data for this pollutant because it is bioaccumulative, and it is listed as impairing South San Francisco Bay (Clean Water Act 303(d) list).

80. ***Mercury***: In analyzing mercury, the Board evaluated two separate data sets, since the Alviso Ponds should contain higher levels than those found elsewhere in the system, due to historic mining legacy in the watershed. The results of this analysis are summarized in Table 17 below:

Table 17: Summary of Mercury in Salt Ponds and Ambient Levels

Pond Systems	Salt Pond Value[1]	Ambient[2]	ER-Low	ER-Median	Above Ambient and ER-Low?
Alviso	0.53	1.1	0.15	0.71	No
Baumberg/West Bay	0.19	0.43	0.15	0.71	No

[1] The Alviso data set for mercury did not fit a normal distribution and the data set for Baumberg and West Bay only consisted of five data points. Therefore, in this analysis the median values of mercury are compared to ambient levels. These values are in mg/kg dry weight and are based on all data that met quality assurance/quality control requirements in the Discharger's Report of Waste Discharge.

[2] As historic mining of mercury in the Alviso Pond watershed likely increased mercury values in these ponds, the Board considered it appropriate to use the median of mercury levels found in the Guadalupe River to be indicative of ambient conditions in this locality. Since mining activities should not have affected the Baumberg and West Bay ponds, the Board compared the mercury levels in these ponds with ambient levels in the Bay.

As shown in Table 17, mercury levels in the Alviso, Baumberg and Redwood City Ponds are below ambient levels. While mercury concentrations are below ambient levels, the Discharger will collect additional baseline data for mercury and methyl mercury so that it will be possible to evaluate the effect of the ISP and subsequent restoration on the availability of mercury to wildlife.

81. ***Baseline Sampling.*** To establish more extensive baseline levels for selenium and mercury (including speciation) in the sediment, the Discharger included a sampling plan in its ROWD. The Discharger selected ponds for baseline sampling based on location of the pond (near known contaminated areas of mercury), amount of available data, and anticipated changes in water management (the potential for seasonal ponds to enhance mercury methylation). In the Alviso complex, the Discharger proposes to collect baseline mercury, methyl mercury, and selenium samples from ponds A3N, A2E, A7, A8, A11, A12, A13, A14, and A23. In the Baumberg and West Bay complex, the Discharger proposes to collect mercury and methyl mercury samples from ponds B2, B6A, and West Bay Pond 2. To evaluate how mercury speciation changes during the ISP, this Order requires monitoring for mercury and methyl mercury at the same locations where the Discharger proposes to establish baseline data.

82. ***Toxic Organic Pollutants***. Salt ponds are not expected to contain toxic organic pollutants above background levels, as the mechanism by which salt ponds would accumulate toxic organic pollutants is through the intake of Bay water. This is because suspended solids are the transport mechanism for toxic organic pollutants, and according to the Restoration Report, the current hydraulic regime results in muted flows that minimize the amount of suspended solids that enter the ponds. To confirm that salt ponds sediments do not contain elevated levels of toxic organic pollutants, the ISP indicates that the Discharger collected samples from several ponds. The ISP indicates that toxic organic pollutants were either nondetect or similar to ambient concentrations found in the Bay.

Mercury Methylation. Mobilization of Inorganics, and Baseline Sampling

83. While this Order finds that concentrations of inorganics in pond sediments are not elevated over background levels, mercury concentrations in the Alviso System sediment are much higher than the Baumberg System sediment due to historic mining in this watershed. Therefore, the primary area of concern for mercury methylation will be in the Alviso ponds. Additionally, it is possible that changes in the hydraulic regime could cause inorganics in the sediment to mobilize if pH levels decrease.

84. ***Inorganic Mobilization.*** The ISP indicates that very shallow water depths or sediment exposure to air can result in oxidation of sulfides and organic matter that strongly bind to inorganic contaminants. The oxidation of sulfides ultimately creates sulfuric acid, which has the potential to significantly reduce pH levels in the sediment. Released heavy metals from this process will bind with clays and iron hydroxides provided the pH of the system remains near neutral. However, if the pH drops below 6.0, heavy metals will stay in the dissolved form, as they do not readily bind with solids under acidic conditions. Accordingly, the Discharger should continually assess the potential for exposed sediment or extremely shallow water levels to depress pH.

85. ***Mercury Methylation***. The ecological and health effects of mercury are greatly affected by the transformation of the less hazardous form (e.g., Hg^{2+}) to the extremely toxic form (methyl mercury or MeHg) that bioaccumulates in the food chain. Methyl mercury is primarily formed by microorganisms, but the rate of methylation is also affected by other factors that include: redox potential, pH, sulfides, clays, iron hydroxides, and salinity. The ROWD concludes that at: (a) very low redox potentials, mercury is bound in highly insoluble HgS and is relatively unavailable to methylating organisms, (b) moderately low redox

potentials (-220mV), Hg^{2+} levels rise, and with adequate organic matter and sulfate, sulfate-reducing bacteria can methylate appreciable amounts of mercury; and (c) high redox potentials, mercury methylation ceases and demethylation predominates.

86. ***Mitigation for Mercury Methylation***. The ROWD indicates that to minimize mercury methylation, systems with low redox potential should be left flooded. This is because if the redox potential in flooded systems is very low and if the systems become dry, the redox potential will increase, which may allow Hg^{2+} to become more available to methylating bacteria. If the system is then subsequently flooded, sulfate-reducing bacteria may increase MeHg production.

87. ***Mercury Levels in Salt Ponds***. The highest mercury sediment concentrations are in the Alviso Ponds within the historic Guadalupe River delta. To ensure that mercury methylation does not accelerate within the Alviso Ponds, the Discharger should manage water levels to prevent drying/wetting cycles described in Finding 86. Additionally, the ROWD indicates that the Discharger will monitor closely for mercury methylation and implement corrective measures (modify water levels as necessary) to minimize mercury methylation.

88. ***Water Levels in Alviso***. As the water depths of most of the Alviso Ponds will be about one to two feet, most of them will continue to provide habitat for shorebirds and waterfowl. Current water levels in these ponds are very shallow and the ISP indicates that because some ponds will experience drawdown, there is the potential for oxidation and increased mobilization of inorganics, including the methylation of mercury from wetting/drying cycles. The ISP indicates hydrologic modeling shows that water elevations in ponds with the highest concentrations of inorganics in sediment (A2W, A3W, A5, A9, A10, A15, A16, and A17) will be within one foot of existing conditions and that water levels under existing conditions are expected to be more variable than under the ISP. Hydrologic modeling predicts that ponds A2W, A3W, and A5 will be deeper on average than existing conditions, and ponds A9, A10, A15-A17, will be about 0.5 to 2.5 feet shallower. Additionally, the ISP indicates that hydrologic modeling predicts water depths in these ponds to average between one and three feet. Table 18 below summarizes the expected conditions of certain Alviso Ponds under the ISP:

Table 18: Water Levels in the Alviso System

Pond[1]	Change in Avg. Depth	Summer	Winter	Variation	Lowest Water Level
A2W	0.4 deeper	1.9	2.2	0.5	1.5
A3W	0.2 deeper	1.8	2.1	0.5	1.5
A5	0.4 deeper	1.0	1.2	0.5	0.75 (0.1 existing)
A9	2.5 shallower	2.2	1.7	1.5	1.0
A10	1.0 shallower	2.5	2.2	0.5	1.5
A15	Batch				Not lower than existing
A16	0.5 shallower	1.7	1.6	0.5	1.0
A17	0.5 shallower	1.15	1.05	0.5	Few inches

[1] The ISP indicates that these ponds contained the highest concentration of inorganics, and therefore, create the most concern with regards to mobilization of inorganics and methylation of mercury.

Since the lowest water levels predicted by hydrologic models should not cause drying/wetting conditions to develop, the table above suggests that under the ISP, it is unlikely that conditions will develop that are more favorable to the oxidation of sulfides (potentially lowering the pH) or methylation of mercury.

89. ***Water Levels in Baumberg***. Water depths in the Baumberg Ponds will vary from exposed mud to about 3 feet deep and provide habitat for shorebirds and waterfowl. For these ponds, the ISP will result in more drawdown and lower water elevations. Therefore, these ponds may be subject to increased mobilization of

inorganics and mercury methylation. However, sediment data shows low inorganic concentrations in these ponds, and therefore, there is unlikely to be an impact from water level management in these ponds. To ensure that hydraulic management of the Baumberg system does not create adverse conditions, this Order requires the Discharger to conduct monitoring for inorganics in the sediment and water column.

90. ***Water Levels in the West Bay Ponds***. The ROWD indicates that the Discharger has conducted initial hydraulic modeling for these ponds. The ROWD indicates that the initial water levels proposed by the Discharger should not create conditions that would result in adverse conditions. To evaluate the effect of the West Bay Ponds prior to the initial release, this Order includes a provision that requires the Discharger to submit a technical report that describes the expected effect from these ponds based on hydraulic modeling and adaptive management.

91. ***Pond Water Level Management***. The ISP indicates that the Discharger needs to manage the water regimes of ponds with the highest concentrations of mercury and selenium (A2W, A3W, A5, A9, A10, A15-A17) to minimize mobilization of inorganics, methylation of mercury, and wildlife exposure. To minimize adverse affects, the ISP explains that the Discharger's operation goal is to maintain at least one foot of water in each of these ponds.

Salt Pond Operations

92. ***Maintenance and Monitoring***. The ROWD indicates that salinity and water levels in the ponds are recorded on a weekly basis and the ISP proposes to continue such monitoring. To ensure that gates, culverts, pumps, and internal siphon structures are operating properly, the ROWD indicates that the Discharger proposes to conduct monthly inspections. The other significant maintenance activity involves long-term maintenance of the levees, especially in selected systems, where the time-period for implementing the long-term restoration plan could be longer than 20 years. To compensate for subsidence and erosion, the height of levees needs to be raised over time.

93. ***Operational Constraints***. This Order recognizes that there are constraints in managing pond systems that do not relate to protection of water quality. Those identified in the ISP include:

    a. Direction of water flow (typically unidirectional);
    b. Salt pond levees (limit pond elevations);
    c. Pond connections (flow capacity limited by structural size and pond elevation difference);
    d. Community flood management needs and concerns (future pond operations should recognize flood management needs);
    e. Bottom elevations within ponds (high pond bottom elevations require high water surface elevations, which reduces gravity-driven inflow; where as low pond bottoms require low water surface elevations to minimize erosion, which reduces gravity-driven outflows);
    f. Infrastructure effects (passive design makes it subject to natural variations in pond water levels from rainfall and tidal cycles); and
    g. Seasonal conditions (greater circulation necessary in the summer to maintain low salinity levels).

94. ***Operations Plans***. To ensure that beneficial uses remain protected during continuous circulation periods, this Order requires the Discharger to develop an Operations Plan for each pond system. Each Operations Plan should describe operational constraints pertinent to each system and indicate corrective measures available to the Discharger should it find itself in threatened violation of discharge limits (e.g., salinity, dissolved oxygen, pH).

95. ***Adaptive Management***. As mentioned in an earlier finding, the Discharger proposes to iteratively modify pond operations, as necessary to meet objectives for protecting water quality and wildlife. To clarify the adaptive management strategies the Discharger can implement, Operations Plans should be updated annually,

as necessary, and should describe measures it can implement to improve flow-through (e.g., flexibility for allowing greater inflows and outflows through culverts and/or portable pumps).

96. ***Avian Botulism***. By reducing salinity levels in salt ponds, the ISP may create conditions that are more favorable to avian botulism. This is because the microorganism that produces the toxin causing avian botulism prefers lower salinities. It also requires warm temperatures and anaerobic conditions to become active. The cycle for an avian botulism outbreak is as follows: Invertebrates within ponds may consume the toxin, but tend to store it in their bodies without any adverse affects. Birds that consume these invertebrates may have their nervous systems impacted to the point of death. Signs of an avian botulism outbreak include dead birds or birds that have certain portions of their bodies paralyzed. Birds that die from avian botulism can pass the disease along, as maggots that consume their carcasses become concentrated with the toxin. To prevent nuisance conditions and to reduce the likelihood of an avian botulism outbreak, the Discharger needs to ensure that dissolved oxygen levels in its ponds always remain above one mg/L. Additionally, the Discharger should burn or bury dead bird carcasses that it finds to reduce the likelihood of a severe outbreak of this disease.

97. ***Lower Guadalupe River Flood Protection Project:*** The Santa Clara Valley Water District intends to complete the Lower Guadalupe River Flood Protection Project (Guadalupe Project) in winter 2004 in accordance with Board Order R2-2002-0089, Santa Clara Valley Water District Lower Guadalupe River Flood Protection Project, issued by the Board on September 26, 2002. As designed, the Guadalupe Project would increase flooding at some of the Alviso Salt Ponds. During flood conditions, the Guadalupe Project's Report of Waste Discharge indicated that the project would cause water depths in ponds A5, A7, A8D, A8W and A6 to increase by up to one-foot compared to current conditions. Additionally, the ISP indicates that Santa Clara Valley Water District will use ponds A8, A5, and A7 for flood events approximately greater than a 10-year flood in the lower Guadalupe River. To reduce the impact of flooding, the Report indicates that the District will construct an overflow weir at pond A8W. The Report also states that diverted flood flows can be adequately stored in ponds A5, A7, and A8 and A6 with minimal overbanking into Alviso Slough. The Discharger acknowledges that using these ponds for flood storage may require (a) pumping pond A8D dry to avoid loss of habitat during the snowy plover breeding season, (b) development of a mercury monitoring plan to determine if floodwaters cause mercury concentrations in pond sediments to increase, and (c) implementation of corrective measures if mercury sediment levels are found to exceed any applicable TMDL target and baseline concentrations.

Monitoring Requirements

98. ***Water Quality Monitoring***. This Order requires water quality monitoring within ponds, at discharge points, and in the receiving waters for salinity, metals, dissolved oxygen, pH, and temperature. It also requires receiving water monitoring for benthic organisms. Additionally, this Order requires the Discharger to monitor water levels within ponds.

99. ***Sediment Monitoring***. This Order requires sediment monitoring within the ponds for pH, redox potential, selenium, and mercury (including speciation of mercury to determine if the ISP creates conditions that enhance mercury methylation).

100. ***Remote Sensing***. In 2003, the National Aeronautics and Space Administration (NASA) began a project titled: *Linking In Situ and Remote Sensing (RS) Measurements to Characterize and Monitor Critical Parameters of the Estuarine Wetlands of Southern San Francisco Bay*. The main goal of this project is to determine if spectral indicators may be used to measure salinity levels and other water quality indicators. Two benefits of using remote sensing over a conventional monitoring program are that a) it offers complete spatial coverage of the large project area, and b) could potentially satisfy monitoring requirements that otherwise require significant staff resources. As provided in Provision D.8, the Discharger may submit a

technical report that demonstrates remote sensing provides an appropriate substitute for some of the monitoring requirements contained in this Order.

CEQA Exemption and Public Hearing

101. *Waste Discharge Requirements.* This Order serves as Waste Discharge Requirements, adoption of which is exempt from the provisions of Chapter 3 (commencing with Section 21100) of Division 13 of the Public Resources Code [California Environmental Quality Act (CEQA)] pursuant to Section 13389 of the California Water Code.

102. *Notification.* The Discharger and interested agencies and persons have been notified of the Board's intent to issue requirements for the proposed discharges and have been provided an opportunity to submit their written views and recommendations.

103. *Public Hearing.* The Board, in a public meeting, heard and considered all comments pertaining to the discharge.

IT IS HEREBY ORDERED, pursuant to the provisions of Division 7 of the California Water Code, regulations, and plans and policies adopted thereunder, and to the provisions of the Clean Water Act and regulations and guidelines adopted thereunder, that the Discharger (Finding No. 1 defines the responsibilities for each Agency) shall comply with the following:

A. DISCHARGE PROHIBITIONS

1. After pond systems have completed the initial release, intake from waters of the State into the below pond intakes for such pond systems between December 1 through April 30, is prohibited:

Pond Intake	Pond System
A9	Alviso A14
A17	Alviso A16
B1C	Baumberg B2C

2. The commencement of the initial discharge from Alviso Ponds A14, A16, A19-A21; Baumberg Ponds B2C, B6A, and B8A; and the West Bay Ponds, at a time any other than March 1 through April 30, is prohibited, unless the Discharger satisfies Provision D.7.

3. The commencement of initial discharge from Alviso Ponds A2W, A3W, and A7; and Baumberg Ponds B2 and B11 in 2004 at a time any other than March 1 through July 1, is prohibited, unless the Discharger satisfies Provision D.7.

B. DISCHARGE LIMITATIONS

1. For the initial discharge, ponds shall not discharge waters that exceed the following limits:

Pond System	Salinity (ppt) Instantaneous Maximum
A2W	60
A3W	50
A7	90
A14	100
A16	135
A19-A21	135[2]

Pond System	Salinity (ppt) Instantaneous Maximum
B2	65
B2C	100
B6A	65[1]
B8A	65[1]
B11	65
West Bay Ponds	135

[1] Pond System B6A will be transferred "dry". In modeling the initial release, the Discharger only considered discharges from Pond System B8A. Since both of these pond systems will discharge to Old Alameda Creek, the Discharger must either (a) stagger the initial releases so that the different time periods of initial release do not overlap, or (b) meter the flow to ensure that Old Alameda Creek contains at least 60% bay water (the percentage of bay water assumed in the Discharger's EIR for an initial release from Pond System B8A) during the initial release.

[2] The salinity limits for Alviso Ponds A19-A21 are conditional upon the water levels in these ponds being lowered to the maximum extent practicable by gravity before introduction of tidal action.

2. All pond waters discharging to the Bay or Sloughs shall meet the following limits:

Constituent	Instantaneous Maximum	Instantaneous Minimum	Units
Salinity for continuous circulation	44		ppt
Dissolved Oxygen[1]		5	mg/L
pH[2]	8.5	6.5	

[1] This limitation applies when receiving waters contain at least 5.0 mg/L of dissolved oxygen. In cases where receiving waters do not meet the Basin Plan objective, pond discharges must be at or above the dissolved oxygen level in the receiving water.

[2] The Discharger may determine compliance with the pH limitation at the point of discharge or in the receiving water.

3. Pond waters discharging to the Bay or Sloughs shall not exceed the natural temperature of the receiving waters by 20°F, or more.

4. Dissolved Oxygen Trigger. Within each pond, once the salinity levels at the discharge point are below 44 ppt, if the dissolved oxygen concentration falls below 1.0 mg/L, the Discharger shall implement corrective measures to increase dissolved oxygen concentrations to above 1.0 mg/L in the pond systems in question, and revise its Operation Plan as necessary to minimize reoccurrence.

C. RECEIVING WATER LIMITATIONS

1. The discharges shall not cause the following conditions to exist in waters of the State at any place:

   a. Floating, suspended, or deposited macroscopic particulate matter or foam in concentrations that cause nuisance or adversely affect beneficial uses;

   b. Bottom deposits or aquatic growths to the extent that such deposits or growths cause nuisance or adversely affect beneficial uses;

   c. Alteration of temperature, turbidity, or apparent color beyond present natural background levels;

   d. Visible, floating, suspended, or deposited oil or other products of petroleum origin; and

   e. Toxic or other deleterious substances to be present in concentrations or quantities which will cause deleterious effects on wildlife, waterfowl, or other aquatic biota, or which render any of these unfit for human consumption, either at levels created in the receiving waters or as a result of biological concentration.

2. The discharges shall not cause nuisance, or adversely affect the beneficial uses of the receiving water.

3. The discharges shall not cause the following limits to be exceeded in waters of the State at any one place within one foot of the water surface:

   a. Dissolved Oxygen: 5.0 mg/L, minimum

   The median dissolved oxygen concentration for any three consecutive months shall not be less than 80% of the dissolved oxygen content at saturation. When natural factors cause concentrations less than that specified above, then the discharges shall not cause further reduction in ambient dissolved oxygen concentrations.

   b. Dissolved Sulfide: 0.1 mg/L, maximum

   c. pH: The pH shall not be depressed below 6.5 nor raised above 8.5, nor caused to vary from normal ambient pH by more than 0.5 pH units.

   d. Un-ionized Ammonia: 0.025 mg/L as N, annual median; and 0.16 mg/L as N, maximum.

   e. Nutrients: Waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect beneficial uses.

4. The discharges shall not cause a violation of any particular water quality standard for receiving waters adopted by the Board or the State Board as required by the Clean Water Act and regulations adopted thereunder. If more stringent applicable water quality standards are promulgated or approved pursuant to Section 303 of the Clean Water Act, or amendments thereto, the Board will revise and modify this Order in accordance with such more stringent standards.

D. PROVISIONS

1. **Permit Compliance**
The Discharger shall comply with all sections of this Order beginning on March 17, 2004, except for Discharge Prohibition A.1 and Discharge Limitation B.4, which do not become effective for each pond system until after those systems have completed the initial release of pond waters.

2. **Restoration Work Plan**
Within five years of the adoption of this Order, the Discharger shall submit a work plan that describes how it proposes to maximize the amount of salt pond acreage that it restores to tidal marsh habitat. At a minimum, the work plan should describe the constraints in restoring each pond system, the proposed time for beginning restoration of each system, and mitigation measures to avoid adverse affects to the ecosystem. Based on the results of review of the Restoration Work Plan, the Executive Officer may recommend to the Board that this Order be modified.

3. **Operations Plan and Adaptive Management**
The Discharger shall develop an Operations Plan for each pond system **before it initiates discharge** to ensure that beneficial uses remain protected under the continuous circulation period. Each Operations Plan

shall describe operational constraints pertinent to each system, indicate corrective measures available to the Discharger should it find itself in threatened violation of discharge limits (e.g., salinity, dissolved oxygen, pH), and how the Discharger proposes to adaptively manage each pond system during the initial release. The Discharger shall update each Operations Plan **annually** (as necessary) to reflect any modifications in operation (e.g., increased flow-through) that it might need to implement in order to protect water quality and wildlife. The Operations Plan shall also address avian botulism control, mercury methylation and inorganic mobilization. To document avian botulism control efforts, the Discharger shall monitor salt ponds and nearby receiving waters for the presence of avian botulism, and control outbreaks through the prompt collection and disposal of sick and dead vertebrates. To demonstrate that it is managing pond systems to minimize conditions that could result in the mobilization of inorganics and/or the methylation of mercury, the Discharger should describe how it manages water levels within each pond system and recommend corrective measures should data show that the it is enhancing inorganic mobilization and/or mercury methylation. The Discharger shall submit an annual report documenting the above to the Board **by February 1 of each year**. Each Operations Plan is subject to the written approval of the Executive Officer.

4. **Batch Ponds**
   Before the Discharger operates batch ponds in a manner other than that described in its ROWD, (e.g., ponds 1C and 5C of Baumberg System 2C), it shall submit a technical report demonstrating that high salinity batch ponds will not affect its ability to comply with discharge limitations contained in this Order. This technical report is subject to the written approval of the Executive Officer.

5. **West Bay Ponds**
   Prior to discharging saline waters from the West Bay Ponds, the Discharger shall submit a technical report that evaluates the potential for a) discharges to increase the concentration of metals in receiving waters during the initial release and continuous circulation period, and b) salinity to cause significant impacts to Ravenswood Slough during the continuous circulation period. This technical report is subject to the written approval of the Executive Officer.

6. **Monitoring for Coyote Creek Island Ponds and West Bay Ponds**
   Prior to discharging saline waters from the Coyote Creek Island Ponds and West Bay Ponds, the Discharger shall submit a proposal to add these ponds to the Self-Monitoring Program. In submitting its proposal for the Coyote Creek Island Ponds, the Discharger shall also carbon copy the City of San Jose. This proposal is subject to the written approval of the Executive Officer.

7. **Salinity Variance**
   In the event that the Discharger cannot meet the timing requirements for initial release from lower salinity ponds (Discharge Prohibition A.3) or ponds that it will breach (West Bay Ponds and Coyote Creek Island Ponds); and/or the salinity limits specified for the initial release or continuous circulation period, it may apply to the Executive Officer for a variance by submitting a technical report that demonstrates that there is an equivalent level of protection for the proposed alternative discharge. The Fact Sheet describes parameters that, at a minimum, the Discharger must address in showing that there is equivalent protection. The Executive Officer may grant a variance administratively. All variances must be in writing.

8. **Self-Monitoring Program**
   The Discharger shall comply with the Self-Monitoring Program (SMP) for this Order as adopted by the Board. The Discharger shall submit an annual self-monitoring report **by February 1 of each year**. The SMP may be amended by the Executive Officer in response to a written request by the Discharger, or as necessary to assure collection of information to demonstrate compliance with this Order.

9. **Standard Provisions and Reporting Requirements**
The Discharger shall comply with all applicable items of the Standard Provisions and Reporting Requirements for NON-NPDES Wastewater Discharge Permits, August 1993 (attached), or any amendments thereafter with the exception of General Provisions A.4, A.5, and A.10; Treatment Reliability B.2 and B.3; and General Reporting Requirements C.5, as these requirements are not relevant to this project. Where provisions or reporting requirements specified in this Order are different from equivalent or related provisions or reporting requirements given in 'Standard Provisions', the specifications of this Order shall apply.

10. **Change in Control or Ownership**
   a. In the event of any change in control or ownership of land or discharge facilities presently owned or controlled by the Discharger, the Discharger shall notify the succeeding owner or operator of the existence of this Order by letter, a copy of which shall be immediately forwarded to the Board.
   b. To assume responsibility of and operations under this Order, the succeeding owner or operator must apply in writing to the Executive Officer requesting transfer of the Order. Failure to submit the request shall be considered a discharge without requirements, a violation of the California Water Code.

11. **Review and Modification of Requirements**
The Board shall review the waste discharge requirements in this Order periodically, and may modify this Order under, but not limited to, any of the following circumstances:
   (1) If present or future investigations demonstrate that the discharge(s) governed by this Order will or have adverse impacts on water quality and/or beneficial uses of the receiving waters;
   (2) New or revised WQOs come into effect for the San Francisco Bay estuary and contiguous water bodies (whether statewide, regional, or site-specific). In such cases, discharge limitations in this Order will be modified as necessary to reflect updated WQOs;

I, Bruce H. Wolfe, Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of an order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on March 17, 2004.

Bruce H. Wolfe

BRUCE H. WOLFE
Executive Officer

Attachments:
A. Discharge Facility Location Map
B. Maps of Each Pond System
C. Self-Monitoring Program
D. Fact Sheet
E. Standard Provisions and Reporting Requirements for Non-NPDES WDR (August 1993)

ATTACHMENT A

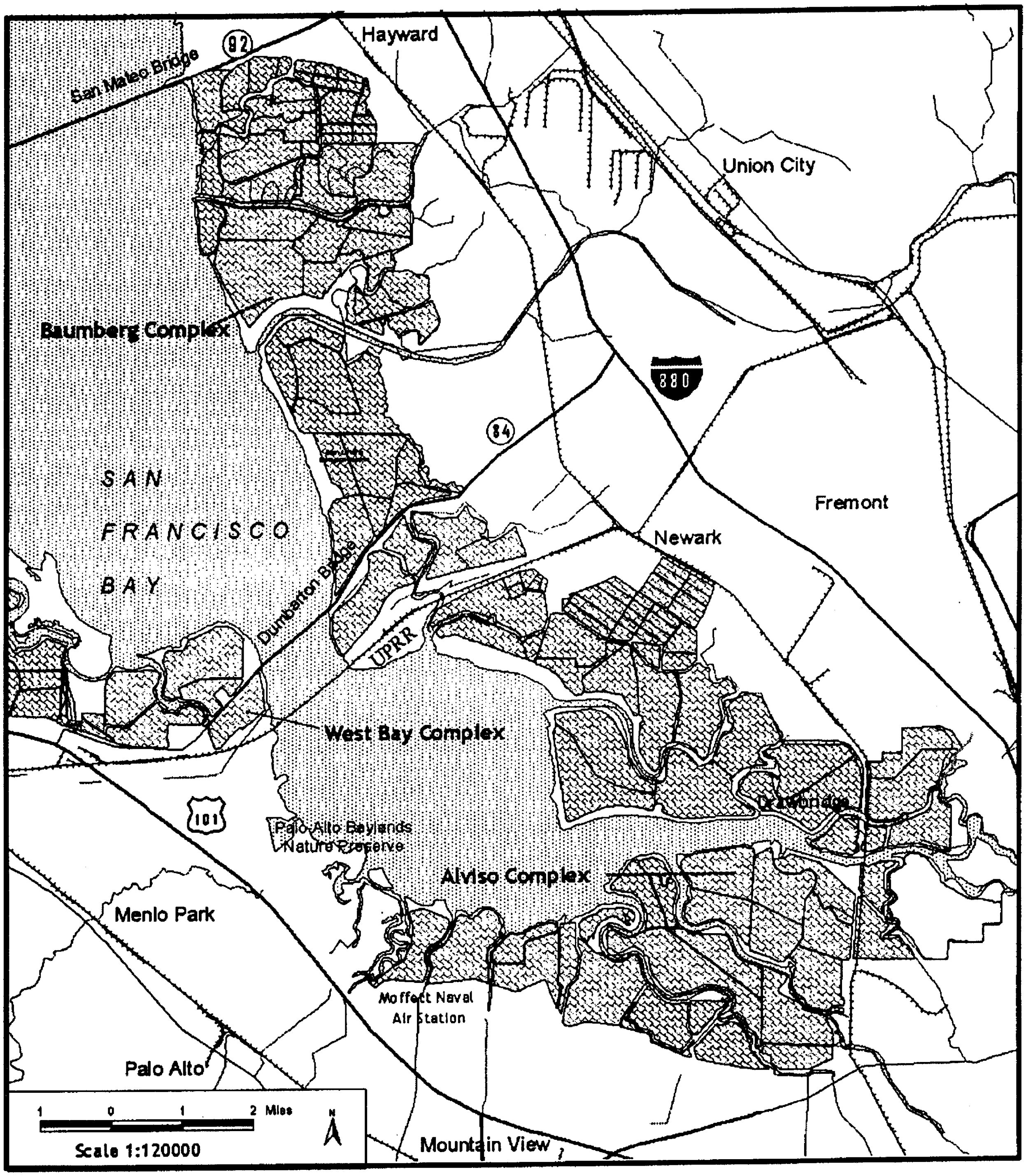


Figure 1-1

Map of Baumberg, Alviso, and West Bay Complexes

ATTACHMENT B

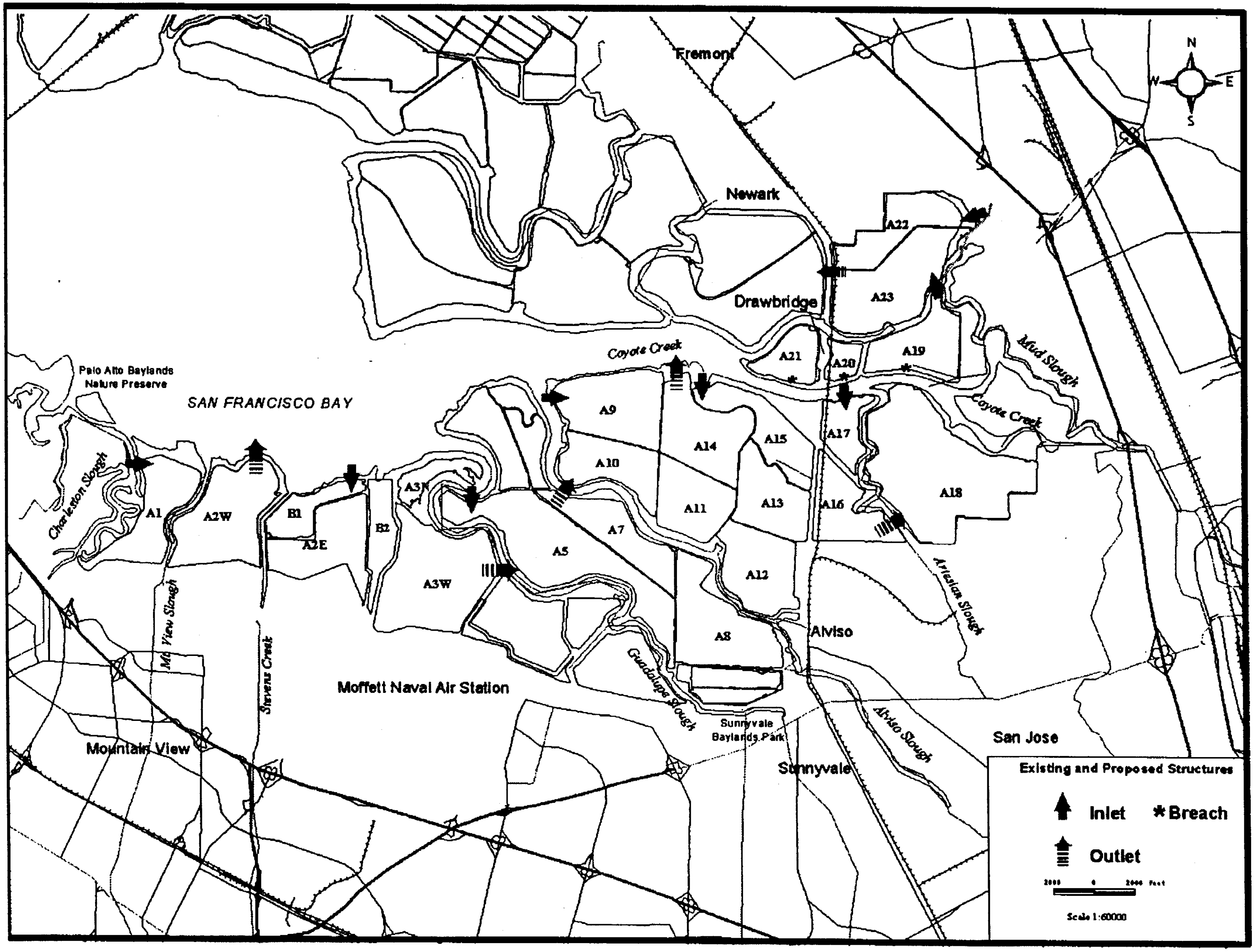


Figure 1-2

Alviso Pond Complex

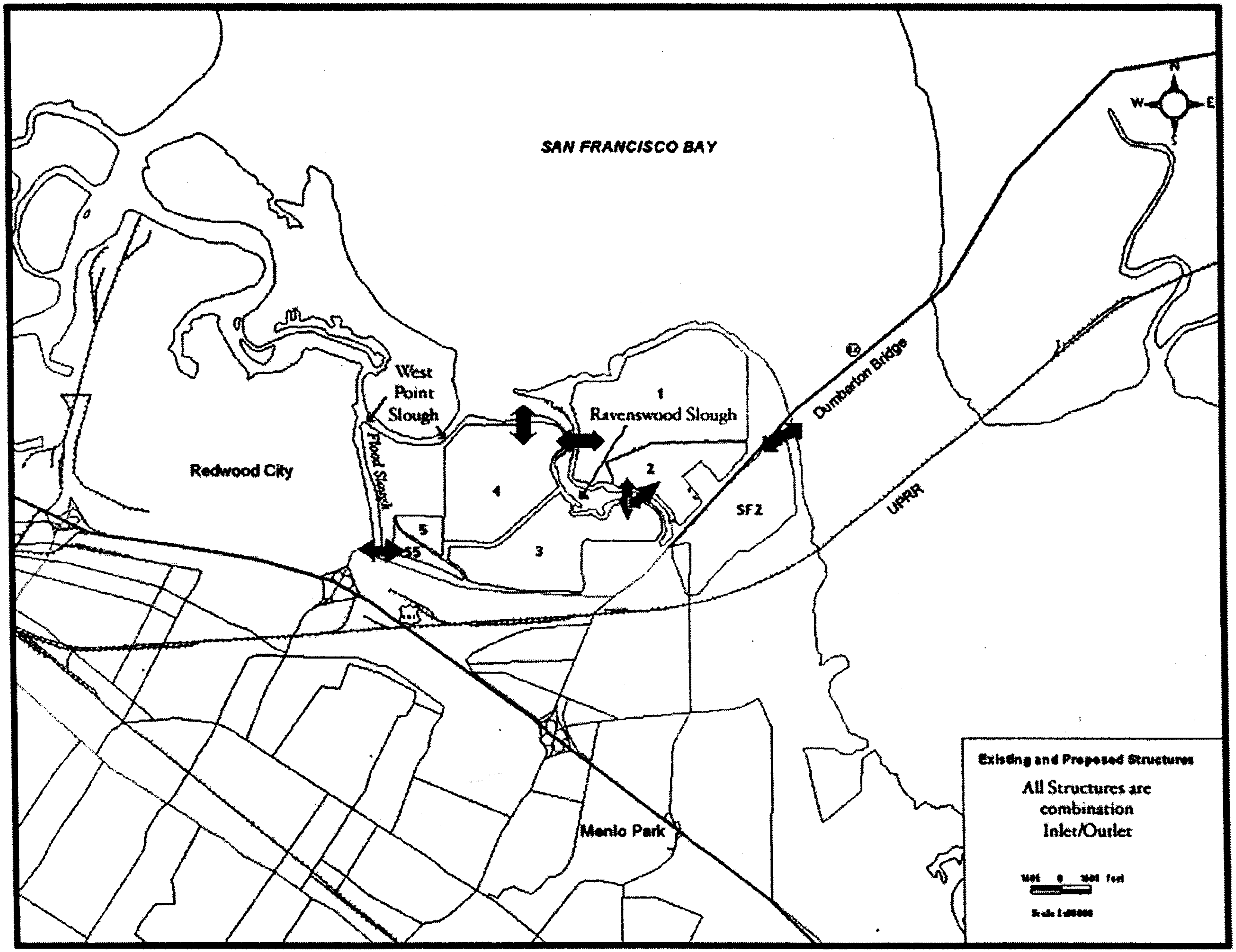


Figure 1-3

West Bay Complex

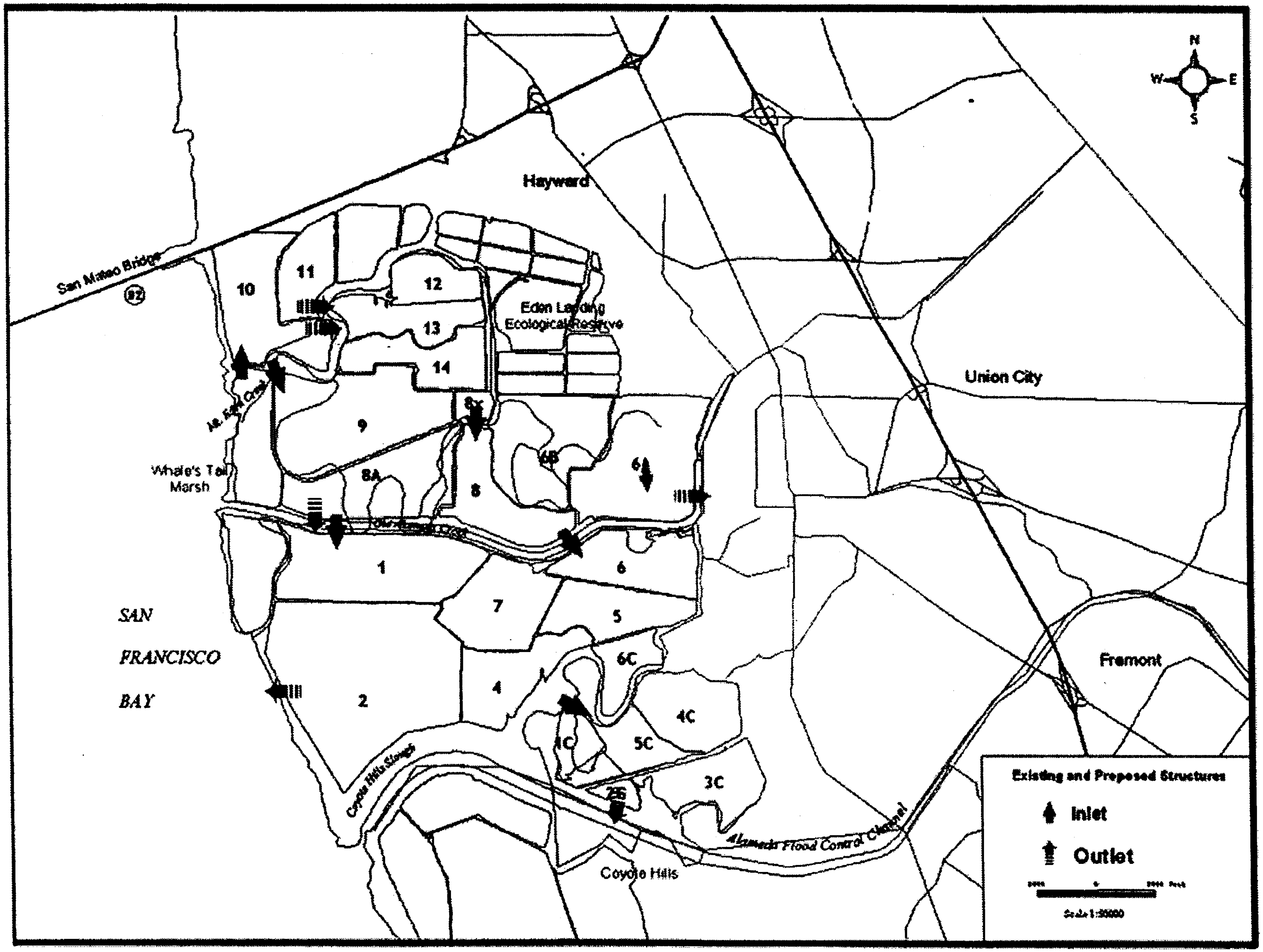


Figure 1-4

Baumberg Pond Complex

ATTACHMENT C

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

SELF-MONITORING PROGRAM

FOR

U.S. FISH & WILDLIFE SERVICE
CALIFORNIA DEPARTMENT OF FISH & GAME
SOUTH SAN FRANCISCO BAY LOW SALINITY SALT PONDS
ALAMEDA, SANTA CLARA, AND SAN MATEO COUNTIES

ORDER NO. R2-2004-0018

WDID NO. 2 019438001

Adopted: March 17, 2004
Effective: March 17, 2004

A. BASIS AND PURPOSE

Reporting responsibilities of waste dischargers are specified in Sections 13225(a),13267(b), 13268, 13383 and 13387(b) of the California Water Code and this Board's Resolution No. 73-16.

The principal purposes of a monitoring program by a waste discharger, also referred to as self-monitoring program, are: (1) to document compliance with waste discharge requirements and prohibitions established by this Regional Board, (2) to facilitate self-policing by the waste discharger in the prevention and abatement of pollution arising from waste discharge, (3) to develop or assist in the development of discharge or other limitations, discharge prohibitions, national standards of performance, pretreatment and toxicity standards, and other standards, and (4) to prepare water and wastewater quality inventories.

B. SAMPLING AND ANALYTICAL METHODS

Sample collection, storage, and analyses shall be performed according to *Standard Methods for the Examination of Water and Wastewater*, 20th Edition, or other methods approved and specified by the Executive Officer of this Board.

Water and waste analyses shall be performed by a laboratory approved for these analyses by the State Department of Health Services (DOHS) or a laboratory waived by the Executive Officer from obtaining a certification for these analyses by DOHS. The director of the laboratory whose name appears on the certification or his/her laboratory supervisor who is directly responsible for analytical work performed shall supervise all analytical work including appropriate quality assurance/quality control procedures in his or her laboratory and shall sign all reports of such work submitted to the Regional Board.

All monitoring instruments and equipment shall be properly calibrated and maintained to ensure accuracy of measurements.

C. SPECIFICATIONS FOR SAMPLING AND ANALYSES

The Discharger is required to perform sampling and analyses according to the schedule in Tables 1 and 2, and in accordance with the following conditions:

Receiving Waters

(1) Receiving water samples shall be collected on days coincident with discharge sampling.

(2 Samples shall be collected within one foot below the surface of the receiving water body, unless otherwise stipulated.

Bottom Sediment Samples and Sampling and Reporting Guidelines

(1) Bottom sediment sample means: (1) a separate grab sample taken at each sampling station for the determination of selected physical-chemical parameters, or (2) four grab samples collected from different locations in the immediate vicinity of a sampling station while the boat is anchored and analyzed separately for macroinvertebrates. Physical-chemical sample analyses include as a minimum:

a) pH

b) TOC (Total Organic Carbon)

c) Selected metals mg/kg dry wt (and soluble metals in mg/l)

d) Particle size distribution, i.e. , % sand, % silt-clay

e) Depth of water at sampling station in feet

f) Water salinity and temperature in the water column within one foot of the bottom.

D. STANDARD OBSERVATIONS

1. Receiving Water

a. Floating and suspended materials of waste origin (to include oil, grease, algae, and other macroscopic particulate matter, presence or absence, source, and size of affected area).

b. Discoloration and turbidity: description of color, source, and size of affected area.

c. Odor: presence or absence, characterization, source, distance of travel, and wind direction.

d. Evidence of beneficial water use: presence of water–associated waterfowl or wildlife, fisherpeople, and other recreational activities in the vicinity of the sampling stations.

e. Hydrographic condition:

1) Time and height of corrected high and low tides (corrected to nearest NOAA location for the sampling date and time of sample and collection).

2) Depth of water columns and sampling depths.

f. Weather conditions:

1) Air temperatures.

2) Wind – direction and estimated velocity.

3) Total precipitation during the previous five days and on the day of observation.

2. Salt Ponds Discharge

a. Floating and suspended material of waste origin (to include algae, and other macroscopic particulate matter): presence or absence

b. Odor: presence or absence, characterization , source, distance of travel and wind direction.

E. RECORDS TO BE MAINTAINED

1. Written reports, strip charts, calibration and maintenance records, and other records shall be maintained by the Discharger and accessible for a minimum of three years. This period of retention

shall be extended during the course of any unresolved litigation regarding this discharge or when requested by the Board. Such records shall show the following for each sample:

a. Identity of sampling and observation stations by number.

b. Date and time of sampling and/or observations.

c. Method of sampling (e.g., grab, composite, or continuous)

d. Date and time that analyses are started and completed, and name of personnel performing the analyses.

e. Complete procedure used, including method of preserving sample and identity and volumes of reagents used. A reference to specific section of Standard Methods is satisfactory.

f. Calculations of results.

g. Results of analyses and/or observations.

F. REPORTS TO BE FILED WITH THE BOARD

1. Self–Monitoring Reports

Annual self-monitoring report: The purpose of the report is to document performance, discharge quality and compliance with waste discharge requirements prescribed by this Order, as demonstrated by the monitoring program data and the Discharger's operation practices. For each calendar year, a self-monitoring report (SMR) shall be submitted to the Board in accordance with the following:

1. The report shall be submitted to the Board no later than February 1 to:

   California Regional Water Quality Control Board
   San Francisco Bay Region
   1515 Clay Street, Suite 1400
   Oakland, CA 94612
   ATTN: Executive Officer

2. *Letter of Transmittal:* Each report shall be submitted with a letter of transmittal. This letter shall include the following:
   a. Order Number and WDID number (see cover sheet of this SMP);
   b. Identification of all violations of discharge limits or other discharge requirements found during the monitoring period;
   c. Details of the violations: parameters, magnitude, test results, frequency, and dates;
   d. The cause of the violations;
   e. Discussion of corrective actions taken or planned to resolve violations and prevent recurrence, and dates or time schedule of action implementation. If previous reports have been submitted that address corrective actions, reference to such reports is satisfactory;
   f. Signature: The letter of transmittal shall be signed by the Discharger's principal executive officer or ranking elected official, or duly authorized representative, and shall include the following certification statement:

"I certify under penalty of law that this document and all attachments have been prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. The information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

3. *Compliance Evaluation Summary:* Each report shall include a compliance evaluation summary. This summary shall include, for each parameter for which discharge limits are specified in the Order, the number of samples taken during the monitoring period, and the number of samples in violation of applicable discharge limits.

4. *Results of Analyses and Observations.*
   a. Tabulations of all required analyses and observations, including parameter, sample date and time, sample station, and test result;
   b. If any parameter specified in Tables 1 and 2 are monitored more frequently than required by this SMP, the results of this additional monitoring shall be included in the monitoring report, and the data shall be included in data calculations and compliance evaluations for the monitoring period;
   c. Calculations for all discharge limits that require averaging of measurements shall utilize an arithmetic mean, unless specified otherwise in this SMP.

5. *Data Reporting for Results Not Yet Available*: The Discharger shall make all reasonable efforts to obtain analytical data for required parameter sampling in a timely manner. The Board recognizes that certain analyses require additional time in order to complete analytical processes and result reporting. For cases where required monitoring parameters require additional time to complete analytical processes and reporting, and results are not available in time to be included in the SMR for the subjected monitoring period, such cases shall be described in the SMR. Data for these parameters, and relevant discussions of any observed violations, shall be included in the next following SMR after the data become available.

6. Electronic Submittals

   The Discharger has the option to submit all monitoring results in electronic reporting format approved by the Executive Officer. If the Discharger chooses to submit the SMRs electronically, it shall submit SMRs electronically via the process approved by the Executive Officer in a letter dated December 17, 1999, Official Implementation of Electronic Reporting System (ERS).

G. DEFINITION OF TERMS

1. A <u>grab sample</u> is defined as an individual sample collected in a short period of time not exceeding 15 minutes. Grab samples shall be collected during normal peak loading conditions for the parameter of interest, which may or may not be during hydraulic peaks. It is used primarily in determining compliance with daily maximum limits. Grab samples represent only the condition that exists at the time the water is collected.

2. A <u>composite sample</u> is defined as a sample composed of individual grab samples mixed in proportions varying not more than plus or minus five percent from the instantaneous rate (or highest concentration) of waste flow corresponding to each grab sample collected at regular intervals not greater than one hour, or collected by the use of continuous automatic sampling devices capable of

attaining the proportional accuracy stipulated above throughout the period of discharge for 8 consecutive or of 24 consecutive hours, whichever is specified in the tables of this SMP.

3. A flow sample is defined as the accurate measurement of the average daily flow volume using a properly calibrated and maintained flow measuring device.

4. Duly authorized representative is one whose:

   a. Authorization is made in writing by a principal executive officer or ranking elected official;

   b. Authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as general partner in a partnership, sole proprietor in a sole proprietorship, the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.)

5. Average values for daily and monthly values is obtained by taking the sum of all daily values divided by the number of all daily values measured during the specified period.

6. Median of an ordered set of values is that value below and above which there is an equal number of values, or which is the arithmetic mean of the two middle values, if there is no one middle value.

7. Daily Maximum limit is the total discharge in a calendar day for pollutants measured by mass or the average measurement obtained for other pollutants.

8. A depth-integrated sample is defined as a water or waste sample collected by allowing a sampling device to fill during a vertical traverse in the waste or receiving water body being sampled and shall be collected in such a manner that the collected sample will be representative of the waste or water body at that sampling point.

9. Bottom sediment sampling and reporting guidelines mean those guidelines developed by Board staff to provide for standard bottom sampling, laboratory, and reporting procedures.

H. Description of Sampling and Observation Stations

Figures 1 through 3 (attached) show the location of each sampling station within ponds, at discharge points, and in receiving waters. Tables 1A, 1B, 2A, and 2B (attached) indicate the sampling stations for the Baumberg and Alviso Systems, constituents to sample, and the sample function.

The Discharger may need to operate certain intake points as discharge structures in order to comply with limits in this Order (e.g., salinity, dissolved oxygen). In these cases, the Discharger should monitor for parameters required for discharge ponds, as indicated in Tables 1A, 1B, 2A, and 2B.

I. Sediment Monitoring

The Discharger shall collect annual samples for mercury and methyl mercury in August or September of each year from select ponds. The Discharger should focus its sampling efforts on ponds that will either be subject to a) significant reductions in salinity, and/or b) fluctuating water levels. In collecting mercury samples, the Discharger shall follow the guidelines in Section C of the SMP, and monitor for pH, TOC, sulfides, and redox potential. Further, the Discharger shall report concentrations of mercury in mg/kg dry weight.

J. Self-Monitoring Program Certification

I, Bruce H. Wolfe, Executive Officer, hereby certify that the foregoing Self-Monitoring Program:

1. Has been developed in accordance with the procedure set forth in this Board's Resolution No. 73-16 in order to obtain data and document compliance with waste discharge requirements established in Board Order No. R2-2004-0018.

2. May be reviewed at any time subsequent to the effective date upon written notice from the Executive Officer or request from the Discharger, and revisions will be ordered by the Executive Officer.

3. Is effective as of March 17, 2004.

BRUCE H. WOLFE
Executive Officer

Attachments:
Table 1A – Initial Release Monitoring for Alviso Ponds
Table 1B – Continuous Circulation Monitoring for Alviso Ponds
Table 2A – Initial Release Monitoring for Baumberg Ponds
Table 2B – Continuous Circulation Monitoring for Baumberg Ponds
Figure 1 – Baumberg Ponds
Figure 2 – Alviso Ponds
Figure 3 – Alviso Ponds

TABLE 1A – INITIAL RELEASE MONITORING FOR ALVISO PONDS

Sampling Station:	D.O.	pH	Temp	Salinity	Benthos	Sample Function
A-A2W-0	E	E	E	E		Management
A-A2W-1	A	A	A	A		Discharge
A-A2W-2	A	A	A	A	D	Receiving Water
A-A2W-3	A	A	A	A	D	Receiving Water
A-A2W-4a	B	B	B	B	D	Receiving Water
A-A2W-4b	B	B	B	B	D	Receiving Water
A-A2W-4c	B	B	B	B	D	Receiving Water
A-A2E-0	E	E	E	E		Management
A-B2-0	E	E	E	E		Management
A-A3W-0	E	E	E	E		Management
A-A3W-1	A	A	A	A		Discharge
A-A3W-2	A	A	A	A	D	Receiving Water
A-A3W-3	A	A	A	A	D	Receiving Water
A-A3W-4	A	A	A	A	D	Receiving Water
A-A3W-6	A	A	A	A	D	Receiving Water
A-A3W-7	A	A	A	A	D	Receiving Water
A-A3W-8	A	A	A	A	D	Receiving Water
A-A3W-9	A	A	A	A	D	Receiving Water
A-A7-0	E	E	E	E		Management
A-A7-1	A	A	A	A		Discharge
A-A7-2	A	A	A	A	D	Receiving Water
A-A7-3	A	A	A	A	D	Receiving Water
A-A7-4	A	A	A	A	D	Receiving Water
A-A7-5	A	A	A	A	D	Receiving Water
A-A7-7	A	A	A	A	D	Receiving Water
A-A7-8	A	A	A	A	D	Receiving Water
A-A11-0	E	E	E	E		Management
A-A14-0	E	E	E	E		Management
A-A14-1	A	A	A	A		Discharge
A-A14-2a	A	A	A	A	D	Receiving Water
A-A14-2b	A	A	A	A	D	Receiving Water
A-A14-2c	A	A	A	A	D	Receiving Water
A-A16-0	E	E	E	E		Management
A-A16-1	A	A	A	A		Discharge
A-A16-2	A	A	A	A	D	Receiving Water
A-A16-4	A	A	A	A	D	Receiving Water
A-A16-5	A	A	A	A	D	Receiving Water
A-A16-6	A	A	A	A	D	Receiving Water

LEGEND FOR TABLE 1A

A = Receiving water samples shall be collected at discrete locations from downstream to upstream around high tide at the following frequency: one week before initiating discharge, one day after the initial discharge, +3, +7, then weekly until the Discharger documents that discharge salinity levels are below 44 ppt. Once discharge begins, discharge pond samples shall be collected before pond water mixes with receiving water using a continuous monitoring device. For days it collects receiving water samples, the Discharger shall also report standard observations, as described in Section D of the SMP.

B = Receiving water samples shall be collected at discrete locations in the Bay at the following frequency: one week before initiating discharge, one day after the initial discharge, +3, +7, then weekly until the Discharger documents that discharge salinity levels are below 44 ppt. For days it collects receiving water samples, the Discharger shall also report standard observations, as described in Section D of the SMP.

C = Not used.

D = Samples for benthos shall be collected from discrete locations at the convenient stage of tide at the following frequency: One week before initiating discharge, 14 days after the initial discharge, +28, once in the late summer (August/September), and then once in the late summer of the following year.

E = Samples shall be collected within ponds at least twice per month for at least the previous 2 months before discharge commences. Dissolved oxygen samples shall be collected between 0800 and 1000 hours. Time of sampling shall be reported.

TABLE 1B – CONTINUOUS CIRCULATION MONITORING FOR ALVISO PONDS

Sampling Station:	D.O.	pH	Temp	Salinity	Chlorophyl a	Metals/Water Column	Sample Function
A-A2W-1	A	A	A	A		C	Discharge
A-A2W-4a	B		B	B			Receiving Water
A-A2W-4b	B		B	B			Receiving Water
A-A2E-0	E	E	E	E	E		Management
A-B2-0	E	E	E	E	E		Management
A-A3N-0	E	E	E	E	E		Management
A-A3W-1	A	A	A	A		C	Discharge
A-A3W-3	A		A	A			Receiving Water
A-A3W-6	A		A	A			Receiving Water
A-A7-1	A	A	A	A		C	Discharge
A-A7-3	A		A	A			Receiving Water
A-A7-7	A		A	A			Receiving Water
A-A8-0	E	E	E	E	E		Management
A-A11-0	E	E	E	E	E		Management
A-A12-0	E	E	E	E	E		Management
A-A13-0	E	E	E	E	E		Management
A-A14-1	A	A	A	A		C	Discharge
A-A14-2a	A		A	A			Receiving Water
A-A14-2c	A		A	A			Receiving Water
A-A15-0	E	E	E	E	E		Management
A-A16-1	A	A	A	A		C	Discharge
A-A16-3	A		A	A			Receiving Water
A-A16-4	A		A	A			Receiving Water

LEGEND FOR TABLE 1B

A = Receiving water slough samples represent one point upstream and one point downstream of the discharge point. The positions indicated on Figures 2 and 3 should be considered approximate. It should be the intent of the Discharger to collect upstream samples at a point where the receiving water is unaffected by the discharge, and downstream samples at a point where the discharge has completely mixed with the receiving water, but as close to the discharge point as practicable. Receiving water slough samples shall be collected monthly from May through October as close to low tide as practicable. Discharge pond samples shall be collected before pond water mixes with receiving water using a continuous monitoring device from May through October. For days it collects receiving water samples, the Discharger shall also report standard observations, as described in Section D of the SMP.

B = Receiving water bay samples represent one point above and one point below the discharge point. The positions indicated on Figures 2 and 3 should be considered approximate. It should be the intent of the Discharger to collect samples as close to the discharge point as practicable with one point unaffected by the discharge, and one point where the discharge has completely mixed with the bay. Receiving water bay samples shall be collected monthly from May through October as close to low tide as practicable. For days it collects receiving water samples, the Discharger shall also report standard observations, as described in Section D of the SMP.

C = Water column samples for total and dissolved arsenic, chromium, nickel, copper, zinc, selenium, silver, cadmium, lead, and mercury shall be collected annually in August or September. When collecting metals samples, the Discharger shall also monitor for salinity, and total suspended solids.

D = Not used.

E = Samples shall be collected within ponds monthly from May through October. Dissolved oxygen samples shall be collected between 0800 and 1000 hours. Time of sampling shall be reported.

TABLE 2A –INITIAL RELEASE MONITORING FOR BAUMBERG PONDS

Sampling Station:	D.O.	pH	Temp	Salinity	Benthos	Sample Function
B-2-0	E	E	E	E		Management
B-2-1	A	A	A	A		Discharge
B-2-2a	B	B	B	B	D	Receiving Water
B-2-2b	B	B	B	B	D	Receiving Water
B-2-2c	B	B	B	B	D	Receiving Water
B-2-3a	B	B	B	B	D	Receiving Water
B-2-3b	B	B	B	B	D	Receiving Water
B-2-3c	B	B	B	B	D	Receiving Water
B-2C-0	E	E	E	E		Management
B-2C-1	A	A	A	A		Discharge
B-2C-2	A	A	A	A	D	Receiving Water
B-2C-3	A	A	A	A	D	Receiving Water
B-2C-4	A	A	A	A	D	Receiving Water
B-2C-5	A	A	A	A	D	Receiving Water
B-2C-7	A	A	A	A	D	Receiving Water
B-3C-0	E	E	E	E		Management
B-6A-0	E	E	E	E		Management
B-6A-1	A	A	A	A		Discharge
B-6A-2	A	A	A	A	D	Receiving Water
B-6A-3	A	A	A	A	D	Receiving Water
B-6A-6	A	A	A	A	D	Receiving Water
B-6A-7	A	A	A	A	D	Receiving Water
B-6B-0	E	E	E	E		Management
B-4-0	E	E	E	E		Management
B-8A-0	E	E	E	E		Management
B-8A-1	A	A	A	A		Discharge
B-8A-2	A	A	A	A	D	Receiving Water
B-8A-3	A	A	A	A	D	Receiving Water
B-8A-4	A	A	A	A	D	Receiving Water
B-10-0	E	E	E	E		Management
B-10-1						Discharge
B-11-0	E	E	E	E		Management
B-11-1	A	A	A	A		Discharge
B-10-11-2	A	A	A	A	D	Receiving Water
B-10-11-3	A	A	A	A	D	Receiving Water
B-10-11-4	A	A	A	A	D	Receiving Water
B-10-11-5	B	B	B	B	D	Receiving Water

LEGEND FOR TABLE 2A

A = Receiving water samples shall be collected at discrete locations from downstream to upstream around high tide at the following frequency: one week before initiating discharge, one day after the initial discharge, +3, +7, then weekly until the Discharger documents that discharge salinity levels are below 44 ppt. Once discharge begins, discharge pond samples shall be collected before pond water mixes with receiving water using a continuous monitoring device. For days it collects receiving water samples, the Discharger shall also report standard observations, as described in Section D of the SMP

B = Receiving water samples shall be collected at discrete locations in the Bay at the following frequency: one week before initiating discharge, one day after the initial discharge, +3, +7, then weekly until the Discharger documents that discharge salinity levels are below 44 ppt. For days it collects receiving water samples, the Discharger shall also report standard observations, as described in Section D of the SMP.

C = Not used.

D = Samples for benthos shall be collected from discrete locations at the convenient stage of tide at the following frequency: One week before initiating discharge, 14 days after the initial discharge, +28, once in the late summer (August/September), and then once in the late summer of the following year.

E = Samples shall be collected within ponds at least twice per month for at least the previous 2 months before discharge commences. Dissolved oxygen samples shall be collected between 0800 and 1000 hours. Time of sampling shall be reported.

TABLE 2B –CONTINUOUS CIRCULATION MONITORING FOR BAUMBERG PONDS

Sampling Station:	D.O.	pH	Temp	Salinity	Chlorophyl a	Metals/Water Column	Sample Function
B-2-1	A	A	A	A		C	Discharge
B-2-2a	B	B	B	B			Receiving Water
B-2-2c	B	B	B	B			Receiving Water
B-2C-1	A	A	A	A		C	Discharge
B-2C-2	A	A	A	A			Receiving Water
B-2C-4	A	A	A	A			Receiving Water
B-3C-0	E	E	E	E	E		Management
B-6A-1	A	A	A	A		C	Discharge
B-6A-3	A	A	A	A			Receiving Water
B-6A-6	A	A	A	A			Receiving Water
B-6B-0	E	E	E	E	E		Management
B-4-0	E	E	E	E	E		Management
B-8A-1	A	A	A	A		C	Discharge
B-8A-3	A	A	A	A			Receiving Water
B-8A-4	A	A	A	A			Receiving Water
B-10-1	A	A	A	A		C	Discharge
B-11-1	A	A	A	A		C	Discharge
B-10-11-2	A	A	A	A			Receiving Water
B-10-11-4	A	A	A	A			Receiving Water
B-12-0	E	E	E	E	E		Management
B-13-0	E	E	E	E	E		Management
B-14-0	E	E	E	E	E		Management

LEGEND FOR TABLE 2B

A = Receiving water slough samples represent one point upstream and one point downstream of the discharge point. The positions indicated on Figure 1 should be considered approximate. It should be the intent of the Discharger to collect upstream samples at a point where the receiving water is unaffected by the discharge, and downstream samples at a point where the discharge has completely mixed with the receiving water, but as close to the discharge point as practicable. Receiving water slough samples shall be collected monthly from May through October as close to low tide as practicable. Discharge pond samples shall be collected before pond water mixes with receiving water using a continuous monitoring device from May through October. For days it collects receiving water samples, the Discharger shall also report standard observations, as described in Section D of the SMP.

B = Receiving water bay samples represent one point above and one point below the discharge point. The positions indicated on Figure 1 should be considered approximate. It should be the intent of the Discharger to collect samples as close to the discharge point as practicable with one point unaffected by the discharge, and one point where the discharge has completely mixed with the bay. Receiving water bay samples shall be collected monthly from May through October as close to low tide as practicable. For days it collects receiving water samples, the Discharger shall also report standard observations, as described in Section D of the SMP.

C = Water column samples for total and dissolved arsenic, chromium, nickel, copper, zinc, selenium, silver, cadmium, lead, and mercury shall be collected annually in August or September. When collecting metals samples, the Discharger shall also monitor for salinity, and total suspended solids.

D = Not used.

E = Samples shall be collected within ponds monthly from May through October. Dissolved oxygen samples shall be collected between 0800 and 1000 hours. Time of sampling shall be reported.

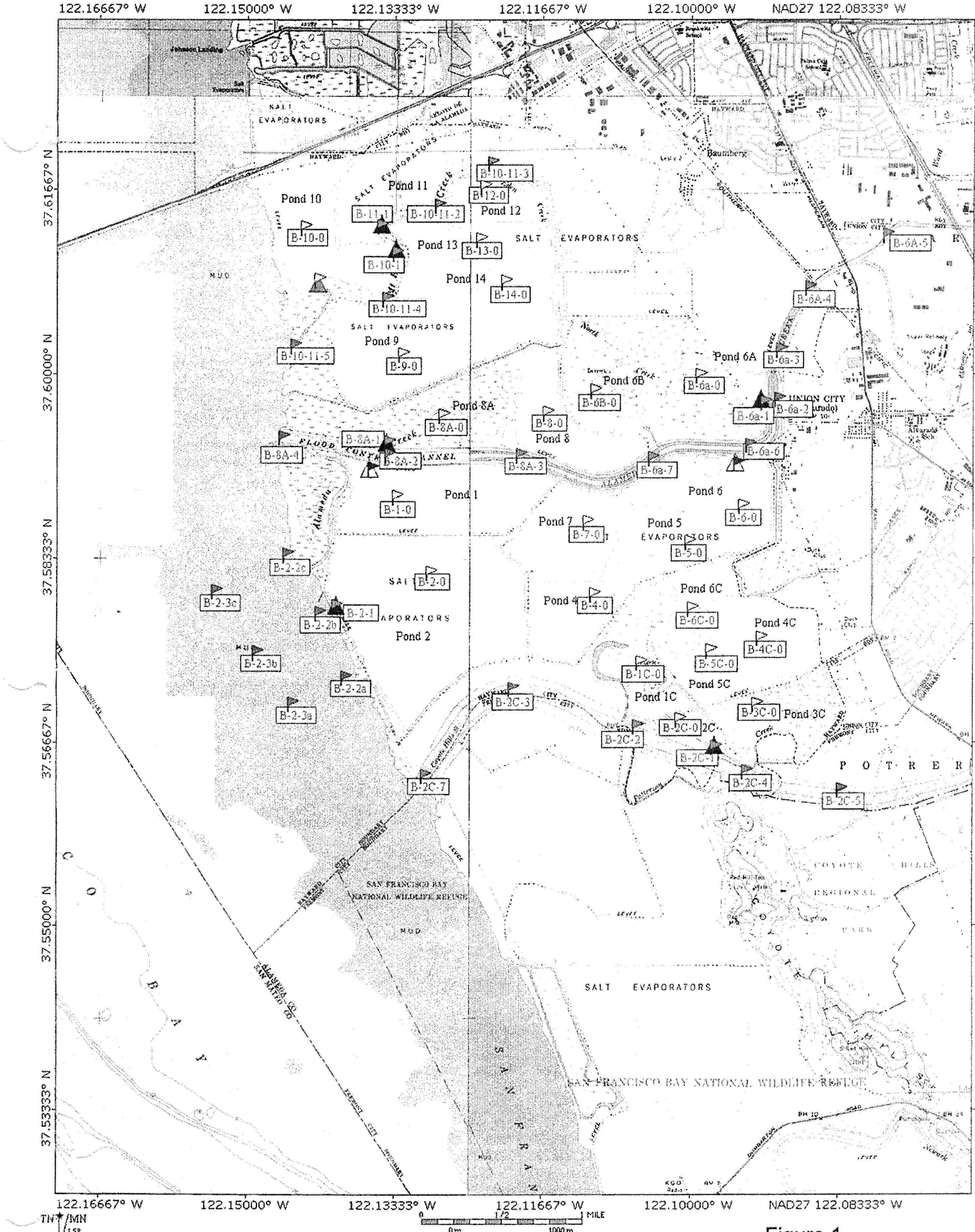
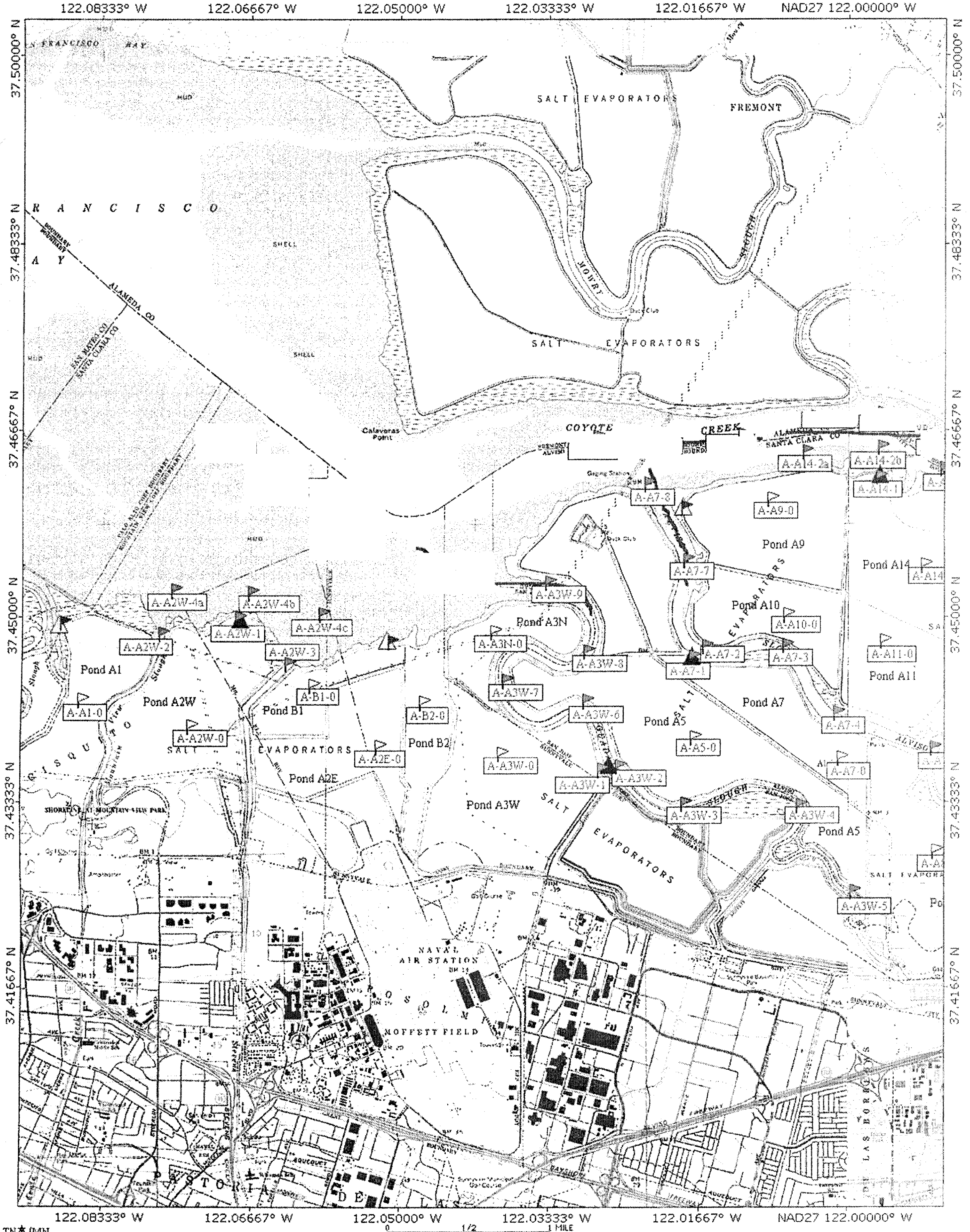


Figure 1

Printed from TOPO! ©2000 Wildflower Productions (www.topo.com)

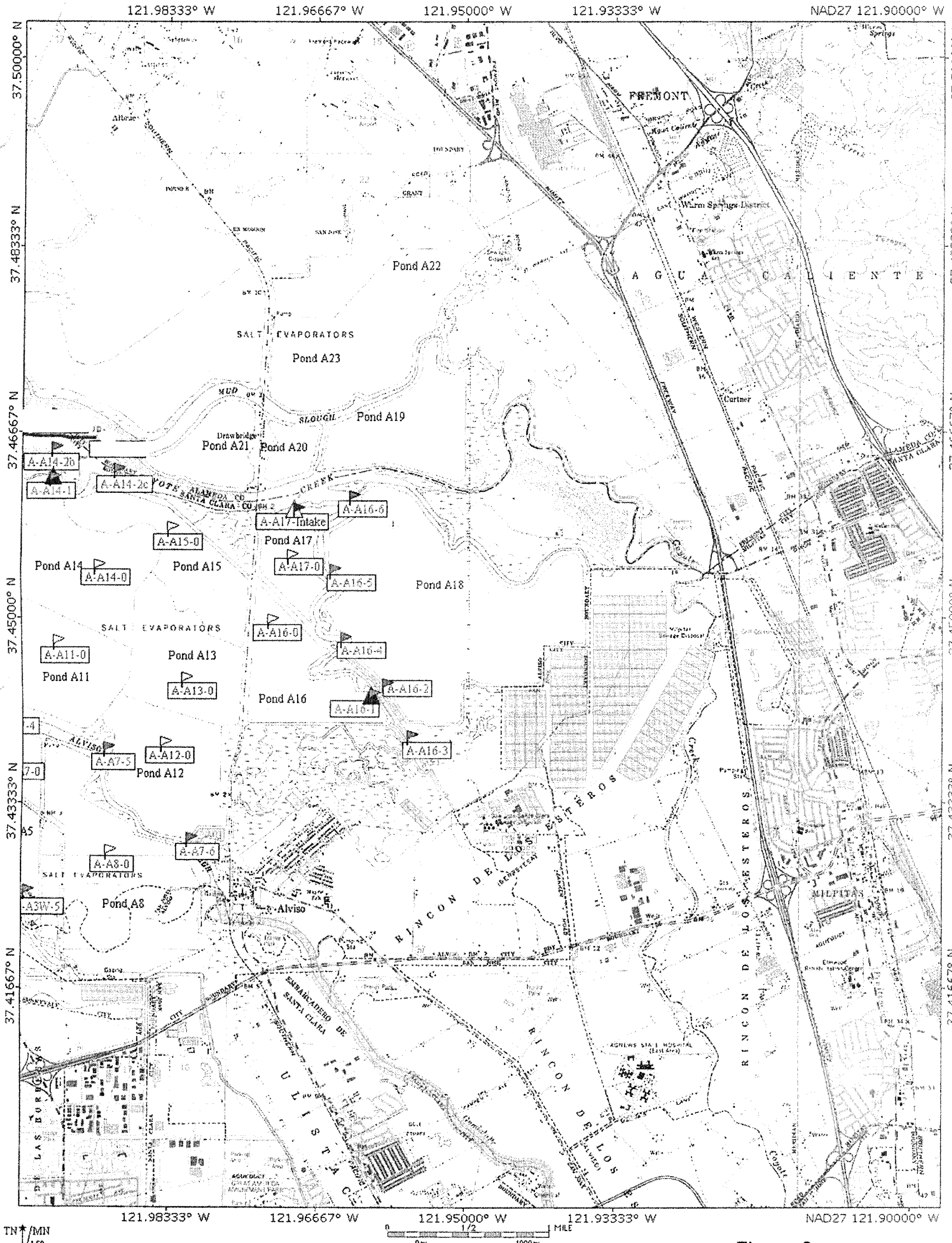
Baumberg



Printed from TOPO! ©2000 Wildflower Productions (www.topo.com)

Figure 2

Alviso Unit A



Printed from TOPO! ©2000 Wildflower Productions (www.topo.com)

Figure 3

Alviso Unit B

ATTACHMENT D

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION
1515 CLAY STREET, SUITE 1400
OAKLAND, CA 94612
(510) 622-2300 Fax: (510) 622-2460

FACT SHEET
for

WASTE DISCHARGE REQUIREMENTS for
U.S. FISH & WILDLIFE SERVICE AND CALIFORNIA DEPARTMENT OF FISH & GAME
SOUTH SAN FRANCISCO BAY LOW SALINITY SALT PONDS
ALAMEDA & SANTA CLARA COUNTY
ORDER NO. R2-2004-0018

PUBLIC NOTICE:

Written Comments

- Interested persons are invited to submit written comments concerning this draft Order.
- Comments must be submitted to the Water Board no later than 5:00 p.m. on February 27, 2004.
- Send comments to the Attention of Robert Schlipf.

Public Hearing

- The draft Order will be considered for adoption by the Board at a public hearing during the Board's regular monthly meeting at: Elihu Harris State Office Building, 1515 Clay Street, Oakland, CA; 1st floor Auditorium.
- This meeting will be held on: March 17, 2004, starting at 9:00 am.

Additional Information

- For additional information about this matter, interested persons should contact Water Board staff member: Mr. Robert Schlipf, Phone: (510) 622-2478; email: rs@rb2.swrcb.ca.gov

This Fact Sheet contains information regarding an application for waste discharge requirements for the U.S. Fish & Wildlife Service and California Department of Fish & Game. The Fact Sheet further describes the factual, legal, and methodological basis for the sections addressed in the proposed Order, and provides supporting documentation to explain the rationale and assumptions used in deriving limitations and requirements.

I. INTRODUCTION

The U.S. Fish & Wildlife Service and California Department of Fish & Game (hereafter Discharger), recently purchased about 15,000 acres of former salt ponds in south San Francisco Bay (South Bay). The Discharger has applied to the Board for issuance of waste discharge requirements to discharge low salinity waters from these ponds to waters of the State. The Application and Report of Waste Discharge (ROWD) are dated January 20, 2004.

The Discharger proposes to discharge saline waters from salt ponds to the Bay and Sloughs. The purpose of this discharge is to maintain and enhance, to the extent possible, the biological and physical conditions within the South Bay salt ponds in the interim period between cessation of commercial salt-making activities and the implementation of a long-term restoration plan. The receiving waters for the subject discharge are the waters of South San Francisco Bay (north and south of Dumbarton Bridge), Guadalupe Slough, Alviso Slough, Coyote Creek, Artesian Slough, Alameda Flood Control Channel, Old Alameda Creek, and Mount Eden Creek. These are tidally influenced waterbodies, mostly with significant fresh water inflows during the wet weather season.

The existing and potential beneficial uses for receiving waters in the vicinity of the discharges, as identified in the Basin Plan are:

a. Industrial Service Supply
b. Navigation
c. Water Contact Recreation
d. Non-contact Water Recreation
e. Commercial and Sport Fishing
f. Wildlife Habitat
g. Preservation of Rare and Endangered Species
h. Fish Migration
i. Shellfish Harvesting
j. Fish Spawning
k. Estuarine Habitat

This Order conservatively assumes that all these water bodies are estuarine under both the Basin Plan and California Toxics Rule (CTR) definitions. Therefore, the discharge limitations specified in this Order for all these discharges are based on the lower of the marine and freshwater Basin Plan WQOs and federally promulgated WQC.

II. HISTORICAL CONTEXT AND POND SYSTEMS

Historical Context. One of the focuses with the Discharger's application was to ensure that it had adequate controls in place to prevent significant salinity increases and acidification of soils as occurred in the North Bay Salt Ponds. According to *Feasibility Analysis: South Bay Salt Pond Restoration* by Stuart Siegel and Philip Bachand, 2002 (hereafter Restoration Report), insufficient water flows to the North Bay Salt Ponds created conditions favorable to sediment oxidation, which decreased sediment pH, and made ponds inhospitable for vegetation colonization. In order to minimize salinity and metals concentration, the potential for low pH in the sediment, mercury methylation, and conditions favorable to low dissolved oxygen in the South Bay Salt Ponds, the Discharger conducted hydrodynamic modeling to ensure that the proposed sizing of inlet and outlet structures would result in adequate flow through. Historically, the salt ponds have not experienced decreased pH.

Pond Systems. The Discharger proposes to discharge saline waters from four salt pond areas that it divided into 19 systems. The Alviso area comprising 7,500 acres contains six systems, the Baumberg area comprising 5,500 acres contains five systems, the Redwood City (West Bay) area comprising 1,600 acres contains five systems, and the Coyote Creek area comprising 500 acres contains three systems. Each system has one or more discharge point to either the Bay or a slough. The California Department of Fish & Game owns and will operate the Baumberg area; and the U.S. Fish and Wildlife Service owns and will operate the Alviso and West Bay areas, including the Coyote Creek area. The details of the proposed inlet and outlet structures for each pond system are described in the Discharger's application. Findings 8 through 21 of the Order describe the size of each pond system, intake water, receiving water, proposed flow routing between ponds, and the estimated hydraulic residence time. The hydraulic residence times indicated in these findings reflect averages and will likely change based on management practices employed by the Discharger; however, they do illustrate the significant lag time and subsequent management constraints involved in reducing salinities or increasing dissolved oxygen levels by flow management alone. As such, the Order requires that the Discharger's operations plan consider corrective measures such as within pond targets for certain constituents in order to comply with the Order's limitations

III. WATER QUALITY

There are two types of discharge associated with the Initial Stewardship Plan (ISP). These are the initial release of higher salinity waters currently in the ponds, and the continuous circulation of water in and out of the ponds. The main parameters of concern for these discharges include salinity, metals, dissolved oxygen, pH, and temperature. The subsections below describe the potential for adverse affects from each of these parameters under the initial release and continuous circulation period.

SALINITY

During the initial release, hydrodynamic modeling predicts that receiving waters will contain elevated levels of salinity. Attachment 1 of the Fact Sheet describes the potential effect from salinity increases during the initial release and the specific rationale of salinity limits for each pond system in detail.

During the continuous circulation period, the Order requires that the maximum salinity discharged from any pond system not exceed 44 parts per thousand (ppt). Modeling efforts by the Discharger show that beneficial uses of receiving waters will be protected under the continuous circulation period because the magnitude and spatial scale of salinity increases will be small (for reference, these increases are also shown in Attachment 1). For the continuous circulation period, the subsections below (based on the Discharger's EIR) describe the expected effect of salinity on each slough (bay impacts will be minimal).

Coyote Creek/Artesian Slough. During the Continuous Circulation Period, the EIR shows predicted salinity elevation in Coyote Creek to be low. For daily-averaged salinity, it is predicted that any increases will be 3 ppt or less and will occur in creek segments in the immediate vicinity of the Pond A14 discharge point. The area of Coyote Creek is directly affected by the freshwater discharge from the San Jose/Santa Clara Water Pollution Control Plant (WPCP), so additional salinity inputs would be unlikely to adversely affect beneficial uses. The predicted daily maximum salinity at the Alviso A14 discharge may exceed 35 ppt at low tide in September and October when pond and bay salinities reach their annual maximums. For the modeled dry year conditions, only an approximate 3.2 acres of Coyote Creek in the immediate discharge channel would have daily maximum salinities in the range of 36 to 41 ppt. Consequently, adverse affects to aquatic life in Coyote Creek as a whole, resulting from elevated salinity, are not expected during the long-term Continuous Circulation Period.

Alviso Slough. During the Continuous Circulation Period, the EIR shows predicted salinity elevation in Alviso Slough to be moderate. For daily-averaged salinity, it is predicted that any increases will be 8 ppt or less and will occur in slough segments near the Pond A7 discharge point. The predicted daily maximum salinity at the Alviso A7 discharge may exceed 35 ppt at low tide in September and October when pond and bay salinities reach their annual maximums. For the modeled dry year conditions, approximately 0.1 acres of Alviso Slough in the immediate vicinity of the discharge would have daily maximum salinities in the range of 36 to 41 ppt. Consequently, adverse affects to aquatic life in Alviso Slough, resulting from elevated salinity, are not expected during the Continuous Circulation Period. However, some benthic community changes could occur near the discharge point.

Guadalupe Slough. During the Continuous Circulation Period, the EIR shows predicted salinity elevation in Guadalupe Slough to be moderate. For daily-averaged salinity, it is predicted that any increases will be 8 ppt or less and will occur in slough segments near the Pond A3W discharge point. The predicted daily maximum salinity at the A3W discharge may exceed 35 ppt at low tide in September and October when pond and bay salinities reach their annual maximums. For the modeled dry year conditions, approximately 0.2 acres of Guadalupe Slough in the immediate vicinity of the discharge would have daily maximum salinities in the range of 36 to 41 ppt. Consequently, adverse affects to aquatic life in Guadalupe Slough, resulting from elevated salinity, are not expected during the Continuous Circulation Period. However, some benthic community changes could occur near the discharge location.

Alameda Flood Control Channel (AFCC). During the Continuous Circulation Period, the EIR shows predicted salinity elevation in the AFCC to be low. For daily-averaged salinity, it is predicted that any increases will be in the range of 1-4 ppt and occur in channel segments near the Pond 2C discharge point. The predicted daily maximum salinity at the Pond 2C discharge may exceed 35 ppt at low tide in September and October when pond and bay salinities reach their annual maximums. For the modeled dry year conditions, approximately 0.2 acres of the AFCC in the immediate vicinity of the discharge would have daily maximum salinities in the range of 36 to

41 ppt. Consequently, adverse affects to aquatic life in the AFCC, resulting from elevated salinity, are not expected during the long-term Continuous Circulation Period.

Old Alameda Creek. For the continuous circulation period, the increase in salinity in Old Alameda Creek is expected to be minimal. The estimated dilution for long-term conditions in the slough is less than 15 percent pond discharge and 85 percent bay water. For late summer in a dry year with 28 ppt in the bay, and 40 ppt discharge from pond B8A, the estimated salinity in the majority of Old Alameda Creek would be approximately 30 ppt. Consequently, adverse affects to aquatic life in Old Alameda Creek resulting from elevated salinity, are not expected during the long-term Continuous Circulation Period. As the Discharger proposes to operate Pond B6A as a muted-tidal system, salinity increases from this system should be minimal. The estimated dilution in the Continuous Circulation Period was based on existing channel and hydrology conditions in the north channel of Old Alameda Creek. However, the Eden Landing Restoration Project has started construction of the new North Creek and the Eden Landing Marsh. The project will increase the tidal prism and may increase the channel cross section over time. Therefore, the Eden Landing Restoration Project will increase the estimated percentage of bay water available for dilution of the B8A discharge.

METALS

The ROWD estimates metals concentrations at each discharge point based on salinity and some empirical salt pond data. To match metals concentrations with the range of salinities proposed for discharge, the ROWD considered (a) samples collected from the salt ponds in October 2002 along a salinity gradient (salinities ranged from 31.6 to 279 ppt), and (b) RMP data from the South Bay and Dumbarton Bridge (salinities ranged from 12 to 20 ppt). The tables below show the modeled salinity in ppt for each pond system and the corresponding estimated maximum metals concentration in μg/L (except for mercury which is in ng/L). Metal concentrations in the discharge that are expected to exceed the minimum applicable receiving water quality objective are shown in italics.

Table 1A: Proposed Maximum Salinities and Metals for Initial Discharge from Alviso Ponds

Pond System	Modeled Salinity	Cr	Ni	Cu	Zn	As	Se	Ag	Cd	Hg	Pb
A2W, A3W	65	2.36	15.7	2.15	3.07	15.7	0.27	0.03	0.063	32	0.84
A7, A14	100[2]	2.36	18.1	2.15	3.38	20.1	0.27	0.15	0.063	44.5	0.84
A16, A19-21	135	2.36	21.8	3.39	4.49	*56.2*	0.31	0.15	0.119	49.7	1.37
WQO[1]		11.4	27	13	86	36	5.0	2.2	0.27	50	3.2

[1] The water quality objectives south of Dumbarton Bridge apply to discharges from the Alviso Ponds. The water quality objectives for chromium, cadmium, and lead are freshwater driven and based on a hardness of 100 mg/L. The initial release of highly saline waters from Alviso Ponds will cause some receiving waters to contain salinity and arsenic in excess of water quality objectives for a short duration.

[2] The modeled salinity used for pond system A7 was 110 ppt.

Table 1B: Proposed Maximum Salinities and Metals for Initial Discharge from Baumberg Ponds

Pond System	Modeled Salinity	Cr	Ni	Cu	Zn	As	Se	Ag	Cd	Hg	Pb
B2, B11	65	2.36	15.7	2.15	3.07	15.7	0.27	0.03	0.063	*32*	0.84
B2C	100	2.36	*18.1*	2.15	3.38	20.1	0.27	0.15	0.063	*44.5*	0.84
B8A	135	2.36	*21.8*	3.39	4.49	*56.2*	0.31	0.15	0.119	*49.7*	1.37
WQO[1]		11.4	16.3	4.6	58	36	5.0	2.3	0.27	25	3.2

[1] The water quality objectives north of Dumbarton Bridge apply to discharges from the Baumberg Ponds. The water quality objectives for chromium, cadmium, and lead are freshwater driven and based on a hardness of 100 mg/L. As the Discharger performed site-specific translators for copper and nickel, the values shown in Table 1B represent site-specific water quality objectives. The initial release of highly saline waters from Baumberg Ponds will cause some

receiving waters to contain salinity, nickel, arsenic, and mercury in excess of water quality objectives for a short duration.

As indicated in Tables 1A and 1B, salt ponds may contain concentrations of nickel, mercury, and arsenic that exceed water quality objectives during the initial release. To determine if pond discharges would cause receiving waters to exceed water quality objectives, the Discharger performed hydrodynamic modeling. This showed that during the initial release pond discharges might cause some exceedances for mercury in Alameda Flood Control Channel and Old Alameda Creek (based on a one-dimensional model because of its small size), but none for arsenic or nickel (when using the nickel site-specific translator,). Attachment 2 describes the site-specific Translator in detail For mercury, the Discharger indicates that based on average receiving water concentrations, it expects one segment of AFCC to exceed water quality objectives, but explains that the magnitude of the increase will be small and the duration short-lived. Under the continuous circulation period, metals are not expected to exceed water quality objectives in any pond systems (when using a site-specific translator for nickel and copper) provided the Discharger ensures that salinities remain below 44 ppt. Accordingly, this Order proposes to use a salinity limit of 44 ppt, as a surrogate for specific limits for metals. This should offer more protection because a) metals do not increase proportionately with increasing salinity because other factors such as biological uptake and adsorption to fine sediments reduce their concentrations, and b) the Discharger can monitor salinity continuously, which will provide it with immediate feedback and the ability to implement corrective measures in a more timely manner.

DISSOLVED OXYGEN AND PH

In lower salinity ponds, dissolved oxygen and pH may present water quality concerns. The Restoration Report indicates that low salinity ponds are likely conducive to algal growth because (a) more algal species can tolerate salinities in this range, and (b) they tend to have elevated nitrogen and phosphorus concentrations, warm temperatures, and good light attenuation. Excessive algal growth can cause dissolved oxygen and pH levels to vary significantly over the day. This is because during daylight hours, photosynthesis will produce oxygen and consume dissolved carbon dioxide (which behaves similar to carbonic acid). During nighttime hours, decomposition of algae will produce dissolved carbon dioxide and consume oxygen. Therefore, any significant algal growth will cause dissolved oxygen and pH levels to peak during the evening hours and to be at their lowest levels in the morning. To determine the diurnal and spatial variation of dissolved oxygen and pH levels in low salinity ponds, the Discharger collected a number of samples from ponds A2E, A2W, B2, B4, and A13. Attachment 3 describes the results of pH and dissolved oxygen monitoring that the Discharger conducted in September 2003. Based on the analysis described in this attachment, compliance with dissolved oxygen limits should be at the point of discharge, and compliance with pH limitations should be at the point of discharge or in the receiving water.

TEMPERATURE

Due to shallow water depths and limited tidal exchange, water temperature in the salt ponds is elevated and varies widely throughout the day. Annual water temperatures within the ponds generally range from 40 to 80°F and generally track air temperature. The State's Thermal Plan indicates that discharges shall not exceed the natural temperature of receiving waters by 20°F, and the discharges shall not cause temperatures to rise greater than 4°F above the natural temperature of the receiving water at any time or place. The ROWD indicates that temperatures collected in the salt ponds on August 26 and 27, 2002, showed values ranging from 19.5 to 32.8°C (67.1 to 91.0°F), and values in the Bay ranging from 26.7 and 28.1°C (80.1 to 82.6 °F). These results indicate that salt pond discharges should comply with the Thermal Plan.

SEDIMENTS

The Restoration Report indicates that the level of contaminants in salt pond sediments are expected to be lower than surrounding areas. This is because the pond systems are currently managed to maintain long detention times that can result in significant algal growth. Algae typically settle to the bottom of ponds, thereby increasing sediment organic content. This addition of biomass dilutes contaminants in these soils. Sediment data collected by the Discharger confirms this with organics at nondetect, and metals typically lower than ambient conditions. Attachment 4 describes sediment data in detail.

IV. SHORT-TERM EXCEEDANCES AND RECOVERY TIMES

The EIR indicates that the South Bay environment requires resident aquatic organisms to have the ability to tolerate fluctuations (e.g., benthic species) and/or have the ability to move to more optimal conditions (e.g., planktonic species). Since benthic organisms do not have the ability to move away from unsuitable conditions, they must be much more tolerant than mobile organisms in order to survive. The EIR indicates that it is not possible to develop a threshold salinity value for the South Bay that would be protective of all exposed organisms because of the variety of species, and the lack of scientific data on salinity tolerance ranges. To address potential adverse affects to resident aquatic organisms, the EIR approximates salinity levels that could have acute (lethal) or chronic (altered physiological function) effects. Attachment 1 provides the matrix developed by the Discharger that relates certain salinity levels to acute and chronic effects. Since the initial release has the potential to adversely affect aquatic life, the Discharger also investigated the potential for recovery should adverse affects occur.

The ROWD indicates that any adverse affects to aquatic organisms during the initial release will be short-lived and that the aquatic community will quickly recover. Based on available literature, the ROWD indicates that benthic communities adversely affected by the initial release should completely recover within one year. To support this position, the ROWD cites a number of studies (enumerated below) that describe quick recovery times for benthic communities subject to perturbations that significantly reduced their numbers.

1) The ROWD indicates that from 1974-1983, Nichols and Thompson studied benthic invertebrate communities in South Bay mudflats. This report found that benthic communities were very persistent over time because of the ability of species to respond quickly to environmental perturbations such as changes in salinity. According to the ROWD, perturbations that greatly reduced or almost eliminated resident species were short-lived, as when favorable conditions returned these species would reestablish within months.

2) The ROWD also cites a report by Hopkins that studied two sites near Palo Alto and Hayward that are close to proposed discharge points from the Alviso and Baumberg units, and therefore, should have a similar benthic invertebrate community. This report found that an unusually wet period resulted in the loss of many benthic invertebrates, but that these species recovered when normal rainfall patterns returned the following year.

3) Additionally, the ROWD cites a report by the California Department of Water Resources (CDWR) that describes an accidental spill of metam sodium in the upper Sacramento River, which eliminated the benthic community for a 26-mile stretch. The CDWR study reports that within four months the diversity found at impacted areas was similar to the upstream control area and that within one year most metrics of then benthic community indicated recovery.

<u>Restoration and timely cessation of salt operations outweighs short-term exceedances</u>. The ROWD indicates that the long-term goal of the ISP is restore tidal and seasonal marsh habitat, which will provide habitat and improve water quality. As potential adverse affects from the ISP include short-term impacts from the initial discharge related to salinity and metals, the ROWD indicates that the benefit of restoring ponds to tidal and seasonal marsh habitat outweighs the environmental cost of the project. Restoring salt ponds to tidal wetland functions will improve water quality in the South San Francisco Bay Estuary on a spatially significant scale, with large contiguous habitat and maximized ecotonal habitat and minimized non-native vegetation. Marsh systems tidally connected to the estuary improve water quality and beneficial uses by filtering and fixing pollutants, providing nursery habitat and protection from predation for native fish species, providing significant biological productivity to the estuarine system, and providing habitat for rare and endangered species. Therefore, the finding of net environmental benefit relevant to water quality and beneficial uses is predicated on the assumption

that tidal marsh restoration in the permitted area is maximized within the constraints of ecologically beneficial habitat goals for migratory birds and all terrestrial and aquatic life dependent on high quality of the waters of the state in the permitted area. These constraints include seasonal migration of salmonid fish species, flood management requirements, existing infrastructure for energy and transportation, and the need to phase restoration carefully over time to avoid displacement of significant quantities of organisms adapted to the existing saline pond habitats along the salinity gradient of 15 to 150 ppt. The finding of net environmental benefit is also based on timely cessation of salt-making operations and the avoidance of the negative consequences of project delays on buildup of salt in the former salt ponds and the associated water quality risks and management costs, as experienced by the dischargers with the North Bay salt ponds.

V. GENERAL RATIONALE

The following documents are the basis for the requirements contained in the proposed Order, and are referred to under the specific rationale section of the Fact Sheet.

The Water Board's June 21, 1995 *Water Quality Control Plan San Francisco Bay Basin (Region 2)* (the Basin Plan);

U.S. EPA's May 18, 2000 *Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California* (the California Toxics Rule – the CTR);

U.S. EPA's National Toxics Rule as promulgated [Federal Register Volume 57, 22 December 1992, page 60848] and subsequently amended (the NTR);

U.S. EPA's March 1991 Technical Support Document for Water Quality-Based Toxics Control (the TSD);

The State Board's *Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California* (Thermal Plan).

VI. SPECIFIC RATIONALE

Several specific factors affecting the development of limitations and requirements in the proposed Order are discussed as follows:

1. Basis for Prohibitions

a) <u>Prohibition A.1 (no intake of water into ponds A9, A17, and B1C from December 1 through April 30)</u>: These ponds intake water from sloughs that support salmonids. This prohibition is to ensure that these pond systems do not entrain juvenile salmonids as they migrate downstream.

b) <u>Prohibition A.2 (initial release from ponds A14, A16, B2C, and B8A cannot commence at any time other than March 1 through April 30)</u>: These ponds have the greatest potential to adversely affect aquatic life because of their high salinities and/or discharge location. This prohibition is to ensure that the initial release of waters from these systems occurs at a time when mixing with freshwater will be maximized, and exposure to sensitive species (e.g., bay shrimp) will be minimized.

c) <u>Prohibition A.3 (initial release from ponds A2W, A3W, A7, B2, and B11 cannot commence at any time other than March 1 through July 1)</u>. The effect of discharges from these systems on aquatic life is unlikely to change if the time-period for initial release is expanded from that indicated in Prohibition A.2. This is because an analysis presented in the Discharger's EIR and included in Attachment 1 shows that in these pond systems and the assimilative capacity of receiving waters will be similar for an April or July release.

2. Basis for Discharge Limitations

a) Discharge Limitation B.1 (salinity limits for the initial release): These limits are based on the narrative salinity objective in the Basin Plan. Attachment 1 provides the rationale and the basis of these limits.

b) Discharge Limitation B.2 (salinity limits for continuous circulation, dissolved oxygen, and pH limits): These limits are based on the Basin Plan. The Fact Sheet (under the heading Water Quality) and Attachment 1 contain the rationale for the salinity limit. Attachment 2 provides the rationale for the dissolved oxygen and pH limits.

c) Discharge Limitation B.3 (temperature): This limit is based on the narrative temperature objective in the Basin Plan and the Thermal Plan.

d) Discharge Limitation B.4 (Dissolved Oxygen Trigger within ponds): The purpose of this trigger is to ensure the Discharger will implement corrective measures to minimize the potential for odors, avian botulism, and mercury methylation. This limits is based on previous permits adopted by California Regional Water Quality Control Board Central Valley Region (e.g., Order No. 5-01-243 for the El Portal Wastewater Treatment Facility).

3. Basis for Receiving Water Limitations

a) Receiving water limitations (C.1, C.2, and C.3 (conditions to be avoided): These limits are based on the narrative/numerical objectives contained in Chapter 3 of the Basin Plan, page 3-2 – 3-5, and are identical to language in nearly all WDRs adopted by the Water Board.

b) Receiving water limitation C.4 (compliance with State Law): This requirement requires compliance with Federal and State Law, and is self-explanatory. This is identical to language in nearly all WDRs adopted by the Water Board.

4. Basis for Self-Monitoring Requirements

This Order requires water quality monitoring within ponds, at discharge points, and in the receiving waters for salinity, metals, dissolved oxygen, pH, and temperature. It also requires receiving water monitoring for fish and invertebrates, and benthic organisms. Additionally, this Order requires the Discharger to monitor water levels, and conduct sediment monitoring for pH, TOC, redox potential, and metals (including speciation of mercury to determine if the ISP creates conditions that enhance mercury methylation) within ponds.

5. Basis for Provisions

a) Provision D.1 (Permit Compliance): This purpose of this provision is to specify the date that the Order becomes effective. The effective date allows the Discharger to release waters from salt ponds provided it complies with the terms and conditions in the Order. It also provides the starting date for which the Discharger must begin to comply with monitoring requirements contained in the Order.

b) Provision D.2 (Restoration Work Plan): The initial release of saline waters from certain pond systems will cause receiving waters to contain elevated levels of salinity, as identified in Finding No. 46 of the Order. To address these concerns by demonstrating net environmental benefit for the project relevant to water quality and beneficial uses, this provision requires the Discharger to submit a work plan that describes how it will maximize the amount of salt pond acreage restored to tidal marsh habitat. This provision is necessary to demonstrate that the Discharger will restore enough salt pond acreage to tidal marsh to outweigh the short-term increases in receiving water salinities.

c) Provision D.3 (Operations Plan and Adaptive Management): This provision requires that the Discharger submit an Operations Plan for each pond system that describes how it will review self-monitoring data and adaptively manage pond systems to ensure that during the continuous circulation period the beneficial uses of receiving waters remained protected. In this case, adaptive management is essential because of the uncertainty associated with managing low salinity ponds and the potential for avian botulism outbreaks and changes in salinity, metals, pH, dissolved oxygen, temperature, and mercury methylation. This provision is necessary to ensure that the Discharger implements best management practices to minimize the potential for these parameters to affect water quality and wildlife.

d) Provision D.4 (Batch Ponds): This provision requires that the Discharger demonstrate that operating ponds 1C and 5C of Baumberg System, or others, as batch ponds will not impact its ability to comply with the discharge limitations contained in this Order. This provision is necessary to ensure that the Discharger does not violate the narrative Basin Plan objective for salinity.

e) Provision D.5 (West Bay Ponds): This provision requires the Discharger to evaluate the potential for a) discharges to increase the concentration of metals in receiving waters during the initial release and continuous circulation period, and b) salinity to cause significant impacts to Ravenswood Slough during the continuous circulation period. This provision is necessary to document that the Discharger has implemented measures to minimize water quality impacts from this discharge.

f) Provision D.6 (Monitoring for Coyote Creek Island Ponds and West Bay Ponds): This provision requires that the Discharger submit a proposal to add these ponds to the self-monitoring program before initiating discharges from these pond systems. This provision is necessary to ensure that the Discharger conducts monitoring in a manner that will enable the Board to evaluate compliance with Order conditions.

g) Provision D.7 (Salinity Variance): The Discharger may petition the Executive Officer to receive a variance from the salinity limitations and/or timing requirements contained in this Order, if it can demonstrate that its proposed alternative discharge at a higher salinity but lower flow will offer an equivalent level of protection. This provision is to provide the Discharger some flexibility in operating subject to natural factors beyond the Discharger's control (e.g., late spring rains that delay installation of water control structures) as long as it does not harm water quality. In making this demonstration, the Discharger should reference modeled salinity levels and modeled flow rates for the system it is seeking a salinity variance. The Discharger must, at a minimum, demonstrate that (1) the mass of salinity discharged under the alternative discharge will not increase on a daily basis from that originally modeled, and (2) metals at the higher salinities of the alternative will not adversely affect beneficial uses. For certain lower salinity pond systems (e.g., A2W) and for the proposed breaching of the Coyote Creek Island Ponds and West Bay Ponds, the Discharger may be able to demonstrate that an initial release outside of the time period required by Prohibitions A.2 and A.3 will be equivalently protective of water quality.

h) Provision D.8 (Self-Monitoring Program): This provision requires compliance with the Self-Monitoring Program (SMP) and is necessary to ensure that the Discharger conducts monitoring of the permitted discharges in order to evaluate compliance with Order conditions. Monitoring requirements are contained in the SMP of the Order and are necessary to ensure the Discharger has sufficient information to adaptively manage pond systems (if necessary) to ensure beneficial uses of receiving waters remain protected.

i) Provision D.9 (Standard Provisions and Reporting Requirements): The purpose of this provision is to require compliance with the standard provisions and reporting requirements given in this Water

Board's document titled *Standard Provisions and Reporting Requirements for NON-NPDES Wastewater Discharge Permits, August 1993* (Standard Provisions), or any amendments thereafter. That document is incorporated in this Order as an attachment to it. Where provisions or reporting requirements specified in this Order are different from equivalent or related provisions or reporting requirements given in Standard Provisions, this Order's specifications shall apply. The standard provisions and reporting requirements given in the above document are based on various state and federal regulations with specified references cited therein.

j) Provision D.10 (Change in Control or Ownership): This provision is necessary to ensure that if this land changes control or ownership, the succeeding owner or operator recognizes that it must comply with the terms and conditions contained in the Order.

k) Provision D.11 (Permit Reopener): This provision is necessary to notify the Discharger that the Board may modify permit conditions to ensure that beneficial uses or receiving waters remain protected.

VII. WASTE DISCHARGE REQUIREMENT APPEALS

Any person may petition the State Water Resources Control Board to review the decision of the Board regarding the Waste Discharge Requirements. A petition must be made within 30 days of the Board public hearing.

VIII. ATTACHMENTS

Attachment 1: South Bay Salt Ponds: Wet Transfer Standard/Salinity Limits
Attachment 2: South Bay Salt Ponds: Translator Study for Nickel and Copper
Attachment 3: South Bay Salt Ponds: Dissolved Oxygen and pH Levels
Attachment 4: South Bay Salt Ponds: Sediment Data

Attachment 1
Technical Memorandum: South Bay Salt Ponds Wet Transfer Standard/Salinity Limits

Summary
Discharge permits in the San Francisco Bay Region contain performance-based effluent limitations calculated at three standard deviations higher than the mean (i.e., the 99.87th percentile). This memorandum evaluates the attainability of such performance-based salinity limits for the initial release from salt ponds. To develop salinity limits for the initial release, we a) statistically analyzed data from each pond system over the last six years, and b) evaluated the potential impact to receiving waters. In statistically analyzing salinity values from each pond system, we considered the 99.87th percentile of salinities for the proposed time of discharge, salinities modeled by the Applicants, and salinity trends (due to the finite capacity to remove brines from the system) when performance-based salinities were lower than those modeled. For most pond systems (A14, A16, A19-21, B2, B2C, B6A, B11, and West Bay), we considered the values modeled by the Applicants (U.S. Fish & Wildlife Service and the California Department of Fish & Game) as acceptable for discharge. For pond systems A2W, A3W, A7, and B8A, we believe a lower salinity limit is necessary. This is because a statistical analysis of the data shows that these pond systems can meet lower limits, and/or that these limits are necessary to minimize elevated salinity in the receiving water. As a condition precedent to the transfer of operational and maintenance responsibility from Cargill to the Applicants for ponds transferred in a 'wet' condition, the liquid in such ponds must meet the applicable discharge requirements for the initial discharge of waters from such ponds as set in an Order adopted by the Board. The Board's discharge requirements, or the initial release salinity limits for the transfer of "wet" ponds, or the "Wet Transfer Condition," equals the salinity limits specified in Table 1 below.

Table 1 below summarizes the values modeled by the Applicants, the 99.87th percentile (based on field conversion factors, described in Attachment A), salinity trends, the proposed initial release salinity limit for each pond system, and the time period for the initial release.

Table 1: Transfer Standard and Initial Release Limits

Pond System[1]	Modeled	99.87th Percentile	Trend	Wet Transfer Std/Salinity Limit[3]	Time of Discharge
A2W	65	50	Increasing	60	March-July
A3W	65	46	No Trend	50	March-July
A7	110	73	Increasing	90	March-July
A14[2]	100	83	Increasing	100	March-April
A16	135	80	Increasing	135	March-April
A19-21	135	> 135	NA	135	March-April
B2	65	68	NA	65	March-July
B2C	100	118	NA	100	March-April
B6A	135 (dry)	> 150	NA	65	March-April
B8A	135	>150	NA	65	March-April
B11	65	79	NA	65	March-July
West Bay	135	> 150	NA	135	March-April

[1] To develop performance based limits, Board staff considered data from (a) March and April for Pond Systems A14, A16, A19-21, B2C, B6A, B8A, and West Bay; and (b) March through July for Pond Systems A2W, A3W, A7, B2, and B11.

[2] Salinity data from Pond System A14 did not fit a normal distribution. Since the discharge pond (A14) for this system represents the higher end of salinity levels and fit a normal distribution, Board staff used it to calculate the 99.87th percentile shown in Table 1.
[3] Pursuant to the Phase-Out Agreement, Cargill may transfer these pond systems anytime during year provided the ponds proposed for transfer meet the Wet Transfer Standard values specified in Table 1 (see Table 2 for batch ponds).

In some cases, the modeled values shown in Table 1 (initial discharge limits proposed by the Applicants) are much higher than the proposed limits. This is because the Applicants based their assessment of attainability on year-round salinity data. Since the time-period for the initial discharge will be limited to the spring season to minimize elevating receiving water salinity, we only used salinity data from this relevant time-period in calculating performance-based limits.

As part of the agreement with the Applicants, Cargill is responsible for managing the ponds to be transferred in a wet condition until the liquid in the ponds meet the applicable salinity discharge requirements for initial release of waters from such ponds (also known as the Wet Transfer Condition). In order to satisfy the conditions of the Wet Transfer Standard, the proposed limits in Table 1 must be met (batch ponds are further addressed below).

Transfer Standard for Batch Ponds. As the initial release period will not include batch ponds, the Applicants have not modeled the potential effect on water quality of discharges from these ponds. Under continuous circulation, the Applicants might need to route waters from batch ponds into pond systems that will discharge to the bay or sloughs, but it should be able to do so at a rate that will not significantly affect water quality. To ensure that batch ponds do not approach levels where gypsum (calcium sulfate) could precipitate out, the Applicants need to prevent salinity levels from exceeding 135 ppt. Table 2 below summarizes salinity levels (in parts per thousand) in batch ponds from four different pond systems and proposes a salinity level to serve as the 'Wet Transfer Standard,' since the Applicants do not contemplate an initial release from such ponds.

Table 2: Year-Round Wet Transfer Standard for Batch Ponds

Pond System	Pond Number	Proposal	Year-Round 99.87th(1)	Wet Transfer Std.
A3W	A3N	65	NA	65
A7	A8	110	120	110
A14	A12	100	68	100
A14	A13	100	85	100
A14	A15	100	111	100
B8A	B12	135	>150	135
B8A	B13	135	>150	135
B8A	B14	135	>150	135

[1] Based on data from 1997 through 2002.

Introduction

This memorandum used a technical and water quality based approach to develop salinity limits for the initial release. It also documents that a salinity limit of 44 ppt for the continuous circulation period will not adversely affect water quality. The technical approach involved statistically analyzing salinity values in each pond system to determine performance-based limits and the attainability of these limits by conducting a trend analysis. The water quality based approach evaluated the expected salinity increase in the Bay and sloughs to determine if more stringent salinity limits are needed.

Performance-Based Limits

To calculate salinity levels at extreme percentiles from each pond system (in this case 99th and 99.87th percentiles), it was necessary to fit data to a normal distribution. This was possible for every pond system with the exception of A14. For pond system A14, Board staff used data from the discharge pond only. Table 3 below indicates the transformation performed to fit data to a normal distribution. It also indicates data points that we removed because these points did not appear to be representative of current salinity levels.

Table 3: Transforming Data Sets to a Normal Distribution

Pond System	Transformation	Data Set
A2W	Logarithmic	1997-2002 (March-July)
A3W	Identity	1997-2002 (March-July)
A7	Logarithmic	1997-2002 (March-July)
A14	Identity	1997-2002 (March-April)
A16	Fourth power	1997-2002 (March-April)
B2	Reciprocal Square	1997-2002 (March-July)[1]
B2C	Identity	2000-2002 (March-April)
B6A	Reciprocal	2000-2002 (March-April)
B8A	Reciprocal Cube	2000-2002 (March-April)
B11	Logarithmic	1997-2002 (March-July)[2]

1 This data set does not include salinity values from ponds 4 and 7 for July 1999, as they do not appear to be representative of levels that the Applicants could discharge during the initial release.

2 This data set does not include salinity values from 1998, as they do not appear to be representative of levels that the Applicants could discharge during the initial release.

After transforming the data, we were able to calculate the 99th percentile (mean plus 2.326 standard deviations and 99.87th percentile (mean plus 3 standard deviations) for each pond system. Table 4 below shows the values modeled by the Applicants, and the 99th and 99.87th percentiles from each pond system based on the field conversion (see Appendix A).

Table 4: Summary of Discharge Pond Salinities

		Field Conversion Percentile		
Pond System[1]	Modeled	99th	99.87th	Data Set
A2W	65	43	50	March-July
A3W	65	42	46	March-July
A7	110	66	73	March-July
A14[1]	100	79	83	March-April
A16	135	77	80	March-April
B2	65	56	68	March-July
B2C	100	106	118	March-April
B6A	135 (dry)	>150	>150	March-April
B8A	135	>150	>150	March-April
B11	65	65	79	March-July

1 Salinity data from Pond System A14 did not fit a normal distribution. Since the discharge pond for this system represents the higher end of salinity levels, Board staff used it to calculate the extreme percentiles shown in Table 4.

The basis for using 99th percentile for limits on the initial release is from the State Implementation Policy (SIP) while the basis for using the 99.87th percentile is from previous permits adopted by the Board. The difference depends on whether one is setting final or interim limits. To develop final water quality based effluent limits, Board staff follows guidance outlined in the SIP. The SIP equates the maximum daily effluent limitation with the 99th percentile of required performance. However, in this case, the initial release will occur over an eight-week period, and therefore, is interim in nature. In previous permitting actions, the Board has set interim limits based on the 99.87th percentile. For this reason, this memorandum used the 99.87th percentile in developing limits for the initial release.

Attainability of Performance-Based Limits

In order to evaluate the attainability of performance-based salinity limits set at 99.87th percentile, we performed a trend analysis on pond systems (i.e., Alviso Ponds) where the performance-based values were lower than those modeled by the Applicants. The purpose of the trend analysis was to take into account the finite capacity to remove brines from the system. For ponds in the Alviso System, current salinities are much lower than those proposed by the Applicants, while ponds in the Baumberg system currently contain salinities that are much higher than those proposed. This is because Cargill recently focused its efforts on reducing salinity levels in Alviso Systems. As Cargill shifts its efforts towards reducing salinity levels in Baumberg ponds, it has indicated that salinities in Alviso Ponds will continue to creep higher.

To address salinity creep in Alviso ponds that are exhibiting increasing trends, we are proposing limits that are higher than the 99.87 percentile of data from 1997 through 2002. We based this increase on linear regressions that used data from 2000 through 2003, accounted for seasonality in ponds A7 and A16 by using cosine and sine functions, and time scale plots (shown in Appendix B) of salinity in ponds A2W and A14 (these ponds did not exhibit linear trends). As trend analyses have to be performed on individual ponds, we used the discharge pond from each system because these ponds contain the highest salinity values and represent a worst-case scenario. Table 5 below includes the pond analyzed, regression equation, regression-coefficient (R^2), and standard error.

Table 5: Regression Equations for Ponds A7 and A16

Pond	Regression Equation	R^2	Standard Error
A7	$\ln(A7) = -128.74 + .06518(\text{Date}) - .09821\cos(2\pi*\text{Date}) - .14411\sin(2\pi*\text{Date})$	0.77	0.08845
A16	$(-1/A16) = -20.746 + 0.01030(\text{Date}) - .00542\cos(2\pi*\text{Date}) - .00821\sin(2\pi*\text{Date})$	0.61	0.01222

In order to provide some certainty in the Applicants ability to meet salinity limits for pond systems that are exhibiting increasing trends, we based the limits on the 99th percentile of the expected values for the expected time of discharge. This resulted in a value of 86 ppt for an initial release in July 2004 from pond A7 (~90 ppt) and a value of 131 ppt for an initial release in April 2005 from pond A16 (~135 ppt). This represents an increase of about 15-65% above the 99.87th percentile of data from 1997-2002. For pond systems A2W and A14, we believe the limit should be set at the lower end of the increases documented for pond systems A7 and A16 (~15%) because the trends in these pond systems, while increasing, appear to be doing so at a slower rate (time-scale plots are provided in Appendix A). For pond system A2W, a 15% increase results in a limit of about 60 ppt, while for pond system A14, it results in a limit of about 100 ppt. In the subsections below, we provide the rational for salinity limits in each pond system by also considering potential impacts to water quality. Appendix C documents the magnitude and spatial scale of salinity increases in each receiving water under the initial release and for reference, under the continuous circulation period.

Pond System A2W

Pond system A2W will discharge waters to the Bay. To represent worst-case conditions, the Applicants modeled discharges from this system at 65 ppt. This showed that salinity levels near the discharge would increase by about 3 ppt during the initial release. While a performance-based statistical analysis indicates that the Applicants should be able to meet an effluent limitation of 50 ppt, a trend analysis indicates that salinities are increasing. Therefore, in this system, we believe a salinity limit higher than the performance-based value is appropriate. To address increasing trends, we propose that the salinity limit for initial release be set at 60 ppt. The initial release of waters from pond system A2W must commence between March and July.

Pond System A3W

Pond system A3W will discharge waters to Guadalupe Slough, which does not provide as much mixing as the Bay. To represent worst-case conditions, the Applicants modeled discharges from this system at 65 ppt. This showed that average salinity levels near the discharge would increase by about 16 ppt during the initial release, effectively shifting the salinity gradient a few km upstream, with maximum daily average salinities exceeding 38 ppt in parts of the slough (Appendix C). A performance-based statistical analysis indicates that the Applicants should be able to meet an effluent limitation of 46 ppt (~50 ppt), and a trend analysis does not show that salinities are increasing in this system. Therefore, we propose that the limit for the initial release be set at 50 ppt. The initial release of waters from pond system A3W must commence between March and July.

Pond System A7

Pond system A7 will discharge waters to Alviso Slough. To represent worst-case conditions, the Applicants modeled discharges from this system at 110 ppt. This showed that salinity levels near the discharge would increase by about 20 ppt during the initial release with maximum daily average salinities exceeding 38 ppt in parts of the slough (Appendix C). While a performance-based statistical analysis indicates that the Applicants should be able to meet an effluent limitation of 73 ppt, a trend analysis indicates that salinities are increasing in this system. Therefore, in this system, we believe a salinity limit higher than the performance-based value is appropriate. To address increasing trends and to minimize elevated salinity in the receiving water, we propose that the salinity limit for initial discharge be set at 90 ppt. The initial release of waters from pond system A7 must commence between March and July.

Pond Systems A14 and A16

Pond system A14 will discharge waters to Coyote Creek and pond system A16 will discharge waters to Artesian Slough. We evaluated these two discharges concurrently because of their proximity to one another. To represent worst-case conditions, the Applicants modeled discharges from A14 at 100 ppt and from A16 at 135 ppt. This showed that salinity levels near the discharge would increase by about 14 ppt during the initial release with maximum daily average salinities exceeding 32 ppt in parts of the slough (Appendix C). While a performance-based statistical analysis indicates that the Applicants should be able to meet an effluent limitation of 83 ppt from A14 and 80 ppt from A16, a trend analysis indicates that salinities are increasing in both systems. Therefore, in these systems, we believe that a salinity limit higher than the performance-based value is appropriate. To address increasing trends and to minimize elevated salinity in the receiving water, we propose that the salinity limit for initial discharge from be set at 100 ppt for A14 and 135 ppt for A16. The initial release of waters from pond systems A14 and A16 must commence between March and April.

Island Ponds A19-A21

Pond system A19-A21 will discharge waters to Coyote Creek. To represent worst-case conditions, the Applicants modeled discharges from this system at 135 ppt. This showed that salinity levels near the discharge would increase by about 12 ppt during the initial release with maximum daily average salinities exceeding 30 ppt in parts of the slough (Appendix C). At this time, salinities in Island Ponds are well above 135 ppt, therefore a performance-based statistical analysis on past data would not provide any insight. Since modeling shows that salinity increases should have a minimal effect on receiving water salinity, we believe the limit for the initial release should be set at 135 ppt. The initial release of waters from the Island Ponds must commence between March and April.

Pond System B2

Pond system B2 will discharge waters to the Bay. To represent worst-case conditions, the Applicants modeled discharges from this system at 65 ppt. This showed that salinity levels near the discharge would increase by about 3 ppt during the initial release. As the Applicant has proposed meeting a salinity limit that is lower than the performance-based limits calculated by staff (68 ppt), and modeling shows minimal affects, we believe the limit for the initial release should be set at 65 ppt. The initial release of waters from pond system B2 must commence between March and July.

Pond System B2C

Pond system B2C will discharge waters to Alameda Flood Control Channel. To represent worst-case conditions, the Applicants modeled discharges from this system at 100 ppt. This showed that salinity levels near the discharge would increase by about 14 ppt during the initial release with maximum daily average salinities exceeding 41 ppt in parts of the slough (Appendix C). As the Applicant has proposed meeting a salinity limit that is significantly lower than the performance-based limits calculated by staff (118 ppt), we believe the limit for the initial release should be set at 100 ppt. The initial release of waters from pond system B2C must commence between March and April.

Pond Systems B6A and B8A

Pond systems B6A and B8A will both discharge to Old Alameda Creek. To represent worst-case conditions, the Applicants modeled discharges from B8A at 135 ppt. In this analysis, the Applicants assumed that B6A would not discharge waters during the initial release period (the pond will be transferred "dry" as defined in the transfer Agreement between the Applicant and Cargill). Additionally, the Applicants could not perform three-dimensional modeling on Old Alameda Creek because of its small dimensions, and therefore, used a one-dimensional model (the Corps of Engineers HEC-RAS). This analysis showed that the average salinity in portions of Old Alameda Creek would be about 70 ppt for a week, which would likely result in severe impacts to resident aquatic species, including benthic, invertebrate, and fish communities. The Applicant has proposed to meet a salinity limit for B8A that is lower than the performance-based limits calculated by staff (> 150 ppt); however, the impacts from its proposal are likely to be severe. Therefore, we believe that a lower salinity limit is necessary to minimize water quality impacts. As such, we propose setting the limit for the initial release at 65 ppt. This stringent of a limitation is necessary to reduce impacts to a larger number of species. Using the assumptions provided by the Applicants (40% pond water and 60% creek water at a salinity of 22 ppt), an initial discharge at 65 ppt would result in an average salinity in portions of Old Alameda Creek of about 40 ppt for one week. Recently, the Applicants indicated that pond system B6A might contain salinity levels as high as 65 ppt when if first starts discharging due to small amounts of residual higher salinity waters in the ditches and low points of the "dry" ponds. In our view, the Applicants may discharge salinity levels up to 65 ppt from B6A provided it either (a) staggers the initial release from B6A and B8A so that the different time periods of initial release do not overlap, or (b) meters the flow to ensure that Old Alameda Creek contains at least 60% bay water if the initial release from pond systems B6A and B8A occur at the same time. The initial release of waters from pond systems B6A and B8A must commence between March and April.

Pond System B11

For the initial release, pond system B11 will discharge waters to the Bay. The Applicants propose to a) operate pond 10 of this system as a muted tidal system under the initial release, and b) route waters from pond 10 to 11 for discharge to Mount Eden Creek under the continuous circulation period. The Applicants propose to discharge waters from this system at a maximum salinity of 65 ppt, which should not result in significant increases in Bay salinity. Since the Applicants have proposed meeting a salinity limit that is significantly lower than the performance-based limits calculated by staff (79 ppt), we believe the limit for the initial release should be set at 65 ppt. The initial release of waters from pond system B11 must commence between March and July.

West Bay Ponds

For the initial release, ponds 1 and 4 will discharge to lower Ravenswood Slough, and pond system SF-2 will discharge to the Bay. To represent a worst-case scenario, the Applicants modeled discharges from this system at 135 ppt. In this analysis, the Applicants propose to phase the initial release by discharging surface waters from ponds 1 and 4 to lower Ravenswood slough until salinities in these ponds reach approximately 50 ppt. At this point, the Applicants propose to connect Pond 2 to Pond 1, and Pond 3 to Pond 4 to dilute the salinity levels in Ponds 2 and 3 before releasing waters from these ponds. This analysis showed that maximum daily average salinity levels should increase by about 5 ppt near the discharge point. For the initial release from pond system SF-2, the Applicant predicts a maximum increase in daily average salinity to be 2 to 4 ppt near the discharge point. As the Applicant has proposed meeting a salinity limit that is significantly lower than the performance-based limit calculated by staff (> 150 ppt), and increases in receiving water salinity appear to be minimal, we believe the limit for the initial release should be set at 135 ppt. The initial release of waters from the West Bay Ponds must commence between March and April.

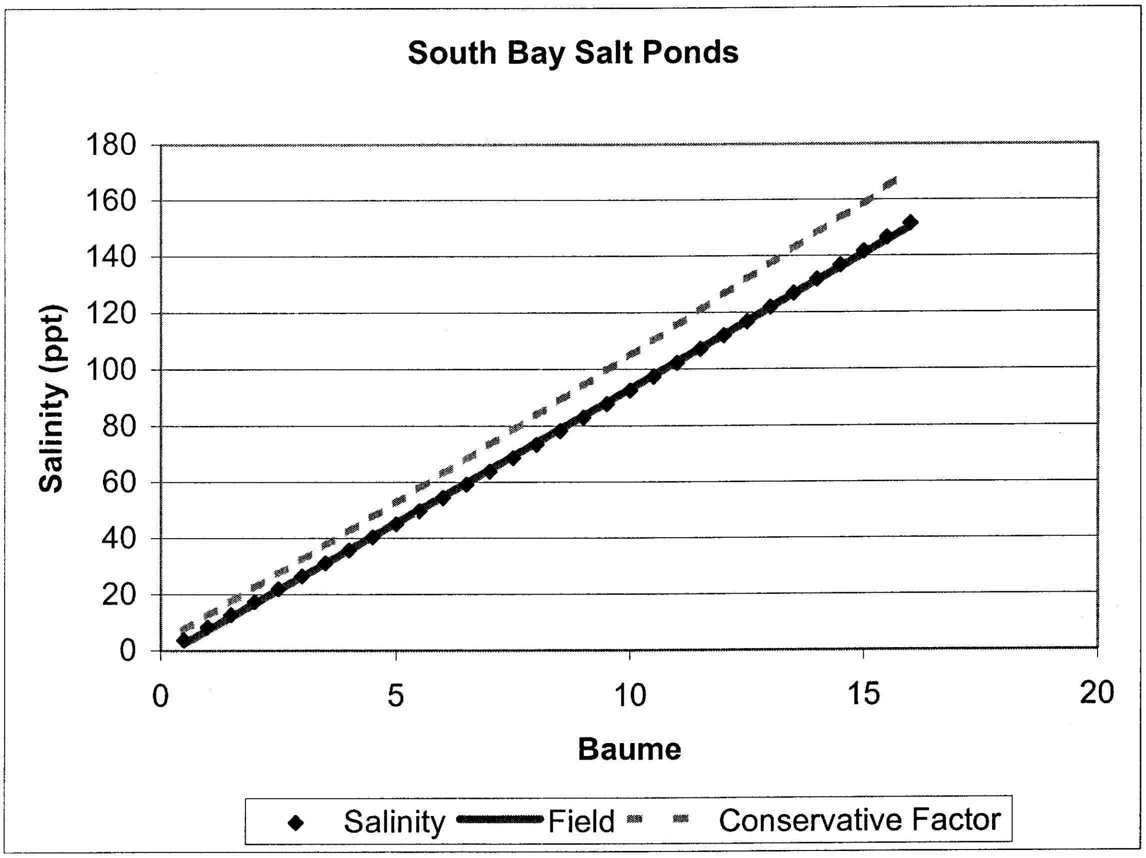
Conclusion

This memorandum includes Wet Transfer Standard values for all ponds (i.e., ponds that will discharge under the initial release scenario and batch ponds). It bases the Wet Transfer Standard and initial release limits on a statistical analysis of data from each pond system (i.e., calculation of extreme values and trends), and potential impacts to receiving waters, as determined by dynamic modeling. For most pond systems (A14, A16, A19-21, B2, B2C, B6A, B11, and West Bay), we consider the values modeled by the Applicants as acceptable for discharge during the time-periods proposed. For pond systems A2W, A3W, A7, and B8A, we believe a lower salinity limit is necessary. This is because a statistical analysis shows that these limits are achievable, and/or modeling results indicate that lower limits are necessary to minimize water quality impacts, given the proposed location of the discharge in sloughs that receive less mixing.

Appendix A: Baume to Salinity Conversion
Appendix B: Time Scale Plots of Pond Salinities
Appendix C: Magnitude and Spatial Scale of Salinity Increases under the Initial Release and the Continuous Circulation Period

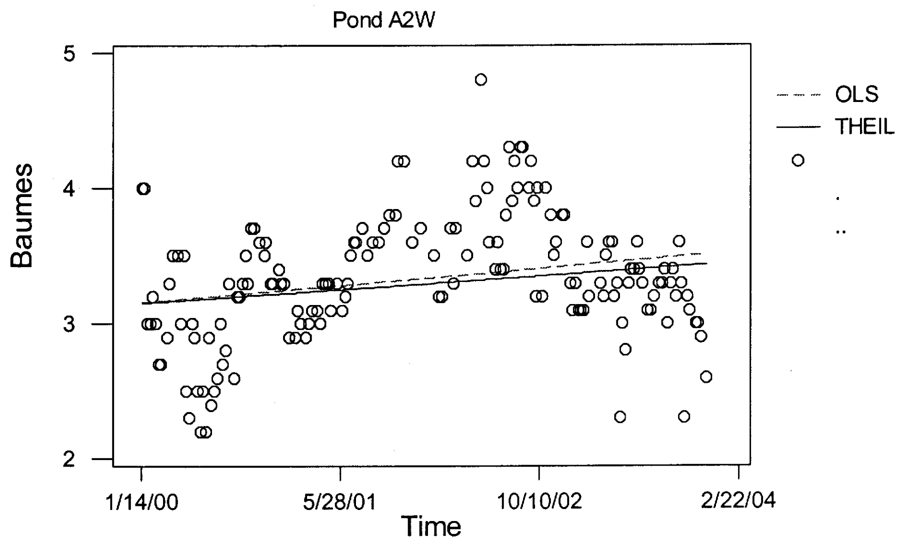
Bâume to Salinity Conversion

In order to manage its pond systems, Cargill usually conducts salinity measurements in baumes on a weekly basis. To evaluate the salinity levels proposed by the Applicants for the initial release, we requested that Cargill provide salinity values from each pond system. To address our concerns, Schaaf and Wheeler, the Applicants' technical consultant, provided pond salinities in baumes, a conversion factor to parts per thousand based on field measurements performed by Dr. Steve Hansen (technical consultant to Cargill), and a more conservative conversion factor developed by the Applicants. The plot below shows salinity values measured by Dr. Steve Hansen on the vertical axis and corresponding Baume measurements on the horizontal axis. The best-fit line equation is based on a linear regression, which shows a nearly perfect correlation between field salinity and field Baume measurements ($R^2 = 0.9999$). The Applicants also developed a conservative conversion factor line (dotted) that it based on a sodium chloride equivalent.

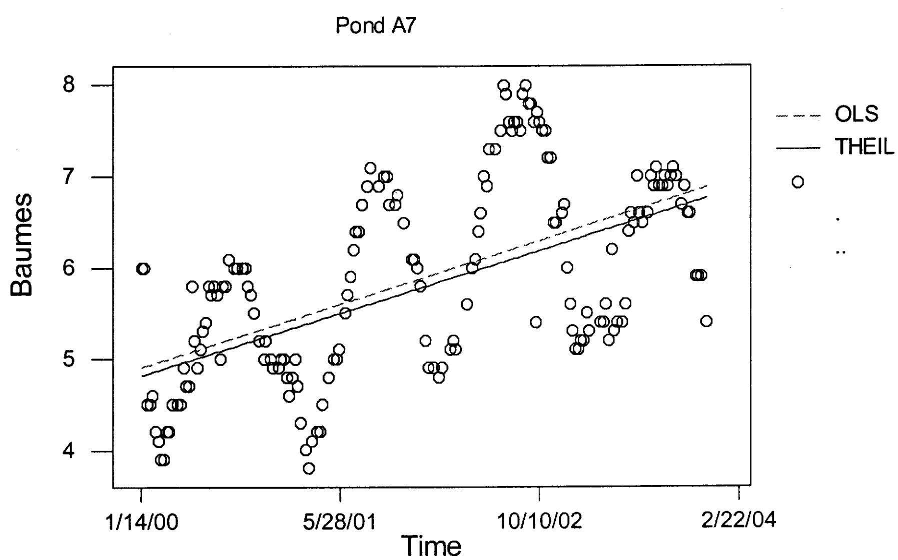


Since the field baume measurements correlate extremely well with the salinity measurements, it is our position that the field conversion factor should be used to determine performance-based salinity limits for the initial discharge.

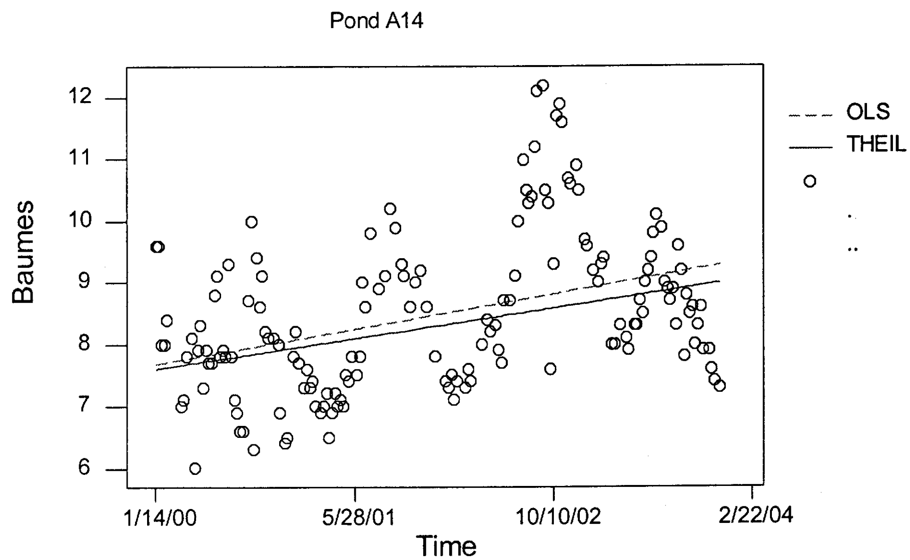
Graph 1: Time Scale Plot of Pond A2W Salinities



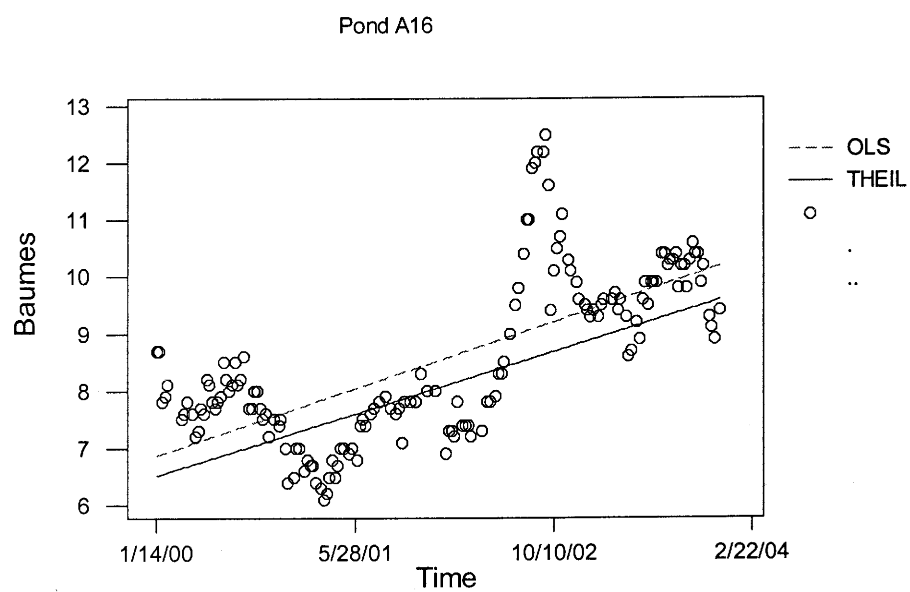
Graph 2: Time Scale Plot of Pond A7 Salinities



Graph 3: Time Scale Plot of Pond A14 Salinities



Graph 4: Time Scale Plot of Pond A16 Salinities



Salinity Increases for the Initial Release and Continuous Circulation Period

Tables 1, 2, and 3 are from the Discharger's Environmental Impact Report (EIR). Table 1 describes the potential effect of salinity levels on aquatic organisms. Tables 2 and 3 summarize the magnitude, duration, and spatial scale of salinity increases. Table 2 summarizes these increases for the initial release period, while Table 3 is for the continuous circulation period.

Table 1. Summary of Potential Salinity Response Characteristics (Summer Conditions)[1]

Class	Salinity Range	Potential Response
Ambient	<33	Benthic species population may vary depending upon species salinity preferences.
Drought	33-35	Chronic exposure: benthic community changes to salinity tolerant species similar to drought years, effects quickly reversed with normal salinity regime. Acute exposure: less of a shift is species composition. In either case, impacts less than significant
Salinity ranges above those encountered in South Bay		
Stage 1	36-38	Chronic exposure: benthic community may lose most sensitive species, impacts considered potentially significant. Acute exposure: less impact on community, impacts considered less than significant.
Stage 2	39-41	Chronic exposure: benthic community may lose larger number of species, impacts considered significant. Acute exposure: less impact on community, impacts considered potentially significant.
Stage 3	41-45	Chronic exposure: community may be limited to most salinity tolerant species, impacts considered significant. Acute exposure: less impact on community but still lose of large number of species, impacts considered significant.
Stage 4	>45	For both chronic and acute exposures, community would be severely reduced. In either case, impacts considered significant.
NOTE: Response criteria based on scant scientific data for local species and therefore must be considered speculative.		

[1] The EIR indicates that the Discharger based the stages on some species that do not inhabit the bay. This is because there is limited information on the tolerance of native species.

Table 2: Modeled Salinity Increases for the Initial Release

			Acres By Salinity Class[1]							
Receiving Water	Date[2]	Total Acres	Ambient Conditions	Drought Conditions	Stage 1	Stage 2	Stage 3	Stage 4	Duration[3]	Context[4] – Percent of Area
SF Bay – Alviso										
April Discharge	4-Apr									
Daily Maximum (2-hr)[5]		29,536	27,869	849	316	198	256	48		1.0
Daily Average (24-hr)[6]		29,546	28,775	385	198	168	10	10		0.6
July Discharge	4-Jul									
Daily Maximum (2-hr)[5]		29,536	22,120	5,387	1,384	376	206	63		0.9
Daily Average (24-hr)[6]		29,546	25,108	3,341	603	119	336	40		1.7
SF Bay – Baumberg										
April Discharge	23-Apr									
Daily Maximum (2-hr)[5]		11,868	11,495	304	49	10	5	5		0.1
Daily Average (24-hr)[6]		11,868	11,631	168	49	0	10	10		0.2
July Discharge	4-Jul									
Daily Maximum (2-hr)[5]		11,868	10,885	563	306	99	10	5		0.1
Daily Average (24-hr)[6]		11,868	11,186	385	208	89	0	0		0.7
Coyote Creek										
April Discharge	5-May									
Daily Maximum (2-hr)[5]		1,232	1,212.5	1.7	0.9	0.3	0.2	4.2		0.4
Daily Average (24-hr)[6]		1,232	1,226.4	1.1	0.8	0.0	0.2	3.2		0.3
*Island Ponds***										
Breach		1,236	1,233	3	0	0	0	0		0.0
Alviso Slough										
April Discharge	8-Apr									
Daily Maximum (2-hr)[5]		273	120.5	21.8	73.5	54.2	2.5	0.3		1.0
Daily Average (24-hr)[6]		273	224.7	43.2	4.6	0	0.2	0.0		0.0
July Discharge	16-Jul									
Daily Maximum (2-hr)[5]		273	151.5	19.6	67	28.0	5.6	1.1		2.4
Daily Average (24-hr)[6]		273	271.0	1.5	0.2	0.0	0.0	0.0		0.0
Guadalupe Slough										
April Discharge	22-Apr									
Daily Maximum (2-hr)[5]		376	368.3	4.0	1.7	1.4	0.2	0.2		0.1
Daily Average (24-hr)[6]		376	369.9	3.6	1.7	0.5	0.2	0.0		0.2

Attachment 1, Appendix C: Salinity Increases for the Initial Release and Continuous Circulation Period

			Acres By Salinity Class[1]							
Receiving Water	**Date[2]**	**Total Acres**	**Ambient Conditions**	**Drought Conditions**	**Stage 1**	**Stage 2**	**Stage 3**	**Stage 4**	**Duration[3]**	**Context[4] – Percent of Area**
July Discharge	24-Jul									
Daily Maximum (2-hr)[5]		376	158.3	92.4	121.3	3.3	0.3	0.2		0.1
Daily Average (24-hr)[6]		376	299.5	75.1	1.2	0.0	0.0	0.0		0.0
Alameda FCC										
April Discharge	2-May									
Daily Maximum (2-hr)[5]		254	132.0	15.5	17.9	60.2	28.3	0.2	1 day	11.2
Daily Average (24-hr)[6]		254	187.1	64.7	2.1	0.1	0.0	0.1		0.0
Old Alameda Creek*										
April Discharge										
Daily Maximum (2-hr)[5]		70						70	2 weeks	100
Daily Average (24-hr)[6]		70						70	2 weeks	100
Ravenswood Slough	3-Mar									
Daily Maximum (2-hr)[5]		116	20	58	15	15	4	4		6.9
Daily Average (24-hr)[6]		116	104	8	4	0	0	0		0
All Sloughs (Total)										
April Discharge	varies									
Daily Maximum (2-hr)[5]		2,321	1,853	101	111	131	35	79		4.8
Daily Average (24-hr)[6]		2,321	2,112	121	13	1	1	73		3.4
July Discharge	Varies									
Daily Maximum (2-hr)[5]		2,321	1,674	187	222	107	39	80		5.1
Daily Average (24-hr)[6]		2,321	2,088	150	8	0	0	73		3.3

Notes:

[1] Ambient Conditions = <33ppt salinity; Drought Conditions = 33-35 ppt salinity; Stage 1 = 36-38 ppt salinity; Stage 2 = 36-38 ppt salinity; Stage 3 = 42-45 ppt salinity; Stage 4 = >45 ppt salinity

[2] Date of maximum day of areal impact during IRP.

[3] Duration of period with 10% or more of area within significant category.

[4] Context – Areal extent of significant intensity classes; greater than 10% considered significant.

[5] Daily maximum salinity predicted for approximately 2 hours of maximum day of IRP.

[6] Daily average salinity over 24 hours of maximum day of IRP.

*** Old Alameda Creek was not modeled in the same detail as the other receiving waters.**

Table 3: Modeled Salinity Impacts for Late Summer Conditions during the Continuous Circulation Period

			Acres By Salinity Class[1]							
Receiving Water	**Date[2]**	**Total Acres**	**Ambient Conditions**	**Drought Conditions**	**Stage 1**	**Stage 2**	**Stage 3**	**Stage 4**	**Duration[3]**	**Context[4] – Percent of Area**
SF Bay – Alviso										
Daily Maximum (2-hr)[5]		11,868	11,243	620	5	0	0	0		0
Daily Average (24-hr)[6]		11,868	11,598	270	0	0	0	0		0
SF Bay – Baumberg										
Daily Maximum (2-hr)[5]		29,536	7,386	22,150	20	0	0	0		0
Daily Average (24-hr)[6]		29,536	11,816	17,720	0	0	0	0		0
Coyote Creek										
Daily Maximum (2-hr)[5]		1,232	1,168	61	3.2	0	0	0		0
Daily Average (24-hr)[6]		1,232	1,202	30	0	0	0	0		0
Alviso Slough										
Daily Maximum (2-hr)[5]		273	270	3	0.1	0	0	0		0
Daily Average (24-hr)[6]		273	271	2	0	0	0	0		0
Guadalupe Slough										
Daily Maximum (2-hr)[5]		376	372	4	0.2	0	0	0		0
Daily Average (24-hr)[6]		376	373	3	0	0	0	0		0
Alameda FCC										
Daily Maximum (2-hr)[5]		254	102	152	0.2	0	0	0		0
Daily Average (24-hr)[6]		254	164	80	0	0	0	0		0
Old Alameda Creek*										
Daily Maximum (2-hr)[5]		70	0	70	0.1	0	0	0		0
Daily Average (24-hr)[6]		70	0	70	0	0	0	0		0
Ravenswood Slough										
Daily Maximum (2-hr)[5]		116	0	56	25	25	10	0		8.6
Daily Average (24-hr)[6]		116	0	116	0	0	0	0		0
All Sloughs (Total)										
Daily Maximum (2-hr)[5]		2,341	1,911	346	28.8	25	10	0		0.4
Daily Average (24-hr)[6]		2,341	2,020	301	0	0	0	0		0

Notes:

[1] Ambient Conditions = <33ppt salinity; Drought Conditions = 33-35 ppt salinity; Stage 1 = 36-38 ppt salinity; Stage 2 = 36-38 ppt salinity; Stage 3 = 42-45 ppt salinity; Stage 4 = >45 ppt salinity

[2] Date of maximum day of areal impact during IRP.

[3] Duration of period with 10% or more of area within significant category.

[4] Context – Areal extent of significant intensity classes; greater than 10% considered significant.

[5] Daily maximum salinity predicted for approximately 2 hours of maximum day of IRP.

[6] Daily average salinity over 24 hours of maximum day of IRP.

Attachment 2

Technical Memorandum: South Bay Salt Ponds Translator Study for Nickel and Copper

Summary

The purpose of this memorandum is to show that during the continuous circulation period, the predicted concentrations for copper and nickel associated with the proposed salinity limit will be protective of beneficial uses. This memorandum summarizes the Translator Study (hereafter Study) for nickel and copper conducted by the Applicants for Old Alameda Creek and Alameda Flood Control Channel (AFCC). It also describes a copper translator completed by Board staff for the Regional Monitoring Program (RMP) station at Dumbarton Bridge. Table 1 below summarizes the results of these efforts and shows that the estimated maximum concentration of copper and nickel in Baumberg pond discharges should not exceed site-specific water quality objectives (WQOs) under the continuous circulation period.

Table 1: Converted Site-Specific Objectives[1] for Copper and Nickel

	Dumbarton Bridge		**Old Alameda Creek**		**AFCC**		**Estimated**
Pollutant	**Chronic**	**acute**	**chronic**	**acute**	**chronic**	**acute**	Maximum
Copper	4.6	5.5	7.2	7.1	5.7	6.9	4.3
Nickel	NA	NA	20.3	226	16.3	231	11.8

[1] All values are in µg/L.

Introduction

The values estimated by the Applicants in its Report of Waste Discharge exceeded the WQO for total nickel of 7.1 µg/L from the Basin Plan and the WQO for total copper of 3.7 µg/L (using a default translator to convert from dissolved to total) from the California Toxics Rule (CTR). These WQOs are typical values based on default site conditions and assumptions. However, site-specific conditions such as water temperature, pH, hardness, concentrations of metal binding sites, particulates organic carbon, dissolved organic carbon, and concentrations of other chemicals can greatly impact the chemical toxicity. The purpose of a translator is to adjust these default assumptions for varying site-specific conditions to prevent exceedingly stringent or under protective WQOs.

Translator Study

The intention of the Study was to address potential exceedances in Old Alameda Creek, Mount Eden Creek, and Alameda Flood Control Channel of copper and nickel WQOs under continuous discharges. Since Old Alameda Creek and Mount Eden Creek primarily contain bay water and are hydrologically directly connected, the translator for Old Alameda Creek is applicable to Mount Eden Creek.

To best represent receiving waters under continuous circulation, the Applicants collected samples from Old Alameda Creek, Alameda Flood Control Channel, and from salt ponds with salinities near 44 ppt (the proposed salinity limit); and instructed the contract laboratory (Frontier Geosciences Inc.) to mix these samples with pond waters at a ratio predetermined by hydrologic modeling. Frontier Geosciences analyzed these samples for pH, salinity, total suspended solids, total recoverable and dissolved nickel and copper.

Data Analysis
The two methodologies that are typically used in developing a translator include calculating it (a) directly from the ratio of dissolved to total, and (b) based on the relationship between fraction dissolved and total suspended solids (TSS). The U.S. EPA's *The Metals Translator: Guidance for Calculating a Total Recoverable Permit Limit from a Dissolved Criterion*, EPA Publication Number 823-B-96-007 indicates that using the direct calculation is appropriate if the fraction dissolved does not correlate with TSS.

In this case, the Study determined that the fraction of dissolved copper and nickel in Old Alameda Creek and Alameda Flood Control Channel strongly correlate with TSS. Table 2 below provides the logarithmic relationship between fraction dissolved and TSS as well as the coefficient of regression.

Table 2: Correlation of Nickel and Copper with TSS

	Nickel		**Copper**	
Receiving Water	**Regression Equation**	**R^2**	**Regression Equation**	**R^2**
Old Alameda Creek	$F_d = -0.221*\ln(TSS) + 1.313$	0.96	$F_d = -0.209*\ln(TSS) + 1.34$	0.93
Alameda Flood Control Channel	$F_d = -0.208*\ln(TSS) + 1.258$	0.76	$F_d = -0.198*\ln(TSS) + 1.321$	0.76

Staff Analysis
In order to calculate site-specific objectives, we had to first ensure that default WQOs were expressed in the dissolved form. Since the CTR expresses WQOs in the dissolved form, we did not have to make any adjustments for copper. However, the nickel WQO is from the Basin Plan and is expressed in the total recoverable form. To convert the nickel WQO from total to dissolved, we used the default CTR conversion factor. This is because the CTR conversion factors are derived under the same laboratory conditions under which the Basin Plan WQOs were developed.

Once we converted WQOs to the dissolved form, we used translators to develop site-specific WQOs. As the Study shows there is a strong correlation between TSS and nickel/copper, we used the regression equations in Table 2 to develop translators for nickel and copper in Old Alameda Creek and Alameda Flood Control Channel. We based the chronic translator on the median of TSS values, and the acute translator on the 10th percentile of TSS values. Table 3 and 4 below show the results of the analysis described above:

Table 3: Translated WQOs for Old Alameda Creek/ Mount Eden Creek

Pollutant	Applicable most stringent WQOs		CTR Conversion Factors		Applicable WQOs basis	Converted dissolved WQOs		Old Alameda Creek-translators		Converted Site-Specific WQOs (total)	
	chronic	acute	Chronic	acute		chronic	Acute	chronic	acute	chronic	acute
Copper	3.1	4.8	NA	NA	CTR, sw	NA	NA	0.43	0.68	7.2	7.1
Nickel	7.1	140	0.99	0.99	BP, sw	7.029	138.6	0.35	0.62	20.3	225.8

Table 4: Translated WQOs for Alameda Flood Control Channel (AFCC)

Pollutant	Applicable most stringent WQOs		CTR Conversion Factors		Applicable WQOs basis	Converted dissolved WQOs		AFCC – translators		Converted Site-Specific WQOs (total)	
	chronic	acute	Chronic	acute		chronic	acute	chronic	acute	chronic	acute
Copper	3.1	4.8	NA	NA	CTR, sw	NA	NA	0.54	0.70	5.7	6.9
Nickel	7.1	140	0.99	0.99	BP, sw	7.029	138.6	0.43	0.60	16.3	231

The converted site-specific WQOs for copper and nickel in Old Alameda Creek and Alameda Flood Control Channel shown in Tables 3 and 4 are greater than the estimated maximum concentration of these two pollutants. As such, the proposed circulation of waters through the Baumberg System to nearby sloughs should not cause an exceedance of site-specific WQOs for nickel and copper.

<u>Copper Translator for Bay Discharges North of Dumbarton Bridge</u>

For discharges north of Dumbarton Bridge, hydrologic modeling indicates that total copper will exceed its translated WQO of 3.7 μg/L. The reason for predicted copper exceedances in bay discharges is the Applicants use of the RMP station at Dumbarton Bridge (copper value of 4.3 μg/L) for estimating metals concentrations under continuous circulation. It turns out that low salinity ponds do not contain copper above the WQO. To address potential exceedances of the translated copper WQO in bay discharges north of Dumbarton Bridge, we further evaluated RMP data to develop a site-specific objective. The RMP data at Dumbarton Bridge did not show a strong correlation with TSS ($R^2 = 0.43$). Therefore, we calculated the translator directly from the fraction dissolved. We based the chronic translator on the median of the fraction dissolved and the acute translator on the 90th percentile. Table 5 below shows the result of this analysis.

Table 5: Translated WQOs for RMP Station at Dumbarton Bridge

Pollutant	Applicable most stringent WQOs		CTR Conversion Factors		Applicable WQOs basis	Converted dissolved WQOs		Dumbarton Bridge translators		Converted Site-Specific WQOs (total)	
	chronic	acute	chronic	acute		chronic	acute	chronic	acute	chronic	acute
Copper	3.1	4.8	NA	NA	CTR, sw	NA	NA	0.68	0.88	4.6	5.5

The converted site-specific WQO for copper at Dumbarton Bridge shown in Table 5 is greater than the estimated maximum concentration of copper from the salt ponds (i.e., 4.3 μg/L). As such, the proposed circulation of waters through the Baumberg System to the bay should not cause an exceedance of site-specific WQO for copper.

Conclusion

Site-specific WQOs for nickel and copper indicate that under the continuous circulation period discharges from Baumberg ponds should not have an adverse impact on receiving waters for these two pollutants.

Attachment 3

Technical Memorandum: South Bay Salt Ponds Dissolved Oxygen and pH Levels

Introduction

This memorandum summarizes the results of dissolved oxygen and pH samples that the Applicants collected in September 2003 from five ponds (i.e., Ponds 2 and 4 in the Baumberg Unit and Ponds A3W, A2E, and A13 in the Alviso Unit). It also places pH and dissolved oxygen values within the context of those typically found in sloughs and in the south bay. The purpose of collecting these data were to determine if dissolved oxygen and pH levels could adversely affect aquatic life mainly from diurnal variations associated with excessive algal growth. The reason algal growth can cause dissolved oxygen and pH levels to vary significantly over the course of a day is because photosynthesis will produce oxygen and consume dissolved carbon dioxide (which behaves similar to carbonic acid) during daylight hours, and respiration will produce dissolved carbon dioxide and consume oxygen during nighttime hours. Therefore, significant algal growth will cause dissolved oxygen and pH levels to peak during the late afternoon and to be at their lowest levels in pre-dawn.

Selection of Ponds

In order to gather dissolved oxygen and pH information that most closely represents discharges during the continuous circulation period; the Applicants collected data from four ponds where the salinity levels ranged from 32 to 43 parts per thousand (ppt). To address discharges from ponds during the phased initial release that would commence in July, the Applicants collected dissolved oxygen and pH information from a fifth pond that contained salinity levels near 63 ppt. As levels of dissolved oxygen and pH can vary considerably in a 24-hour period, the Applicants collected three samples (dawn, midday, and dusk) from each collection point.

Dissolved Oxygen

The data collected by the Applicants shows that dissolved oxygen exhibits a diurnal variation. Because dissolved oxygen levels have the greatest potential to impact water quality in the early morning hours, this memorandum focuses on values collected near dawn. Table 1 below summarizes the number of sample points from each pond, the average salinity level (ppt), and the maximum, average, and minimum dissolved oxygen concentrations (mg/L) near dawn from each pond.

Table 1: Dissolved Oxygen Levels

			Dissolved Oxygen Levels near Dawn		
Ponds	**Sample Points**	**Salinity**	**Maximum**	**Average**	**Minimum**
A2E	10	32.9	9.17	5.83	2.86
A3W	6	40.8	5.47	4.73	4.32
B2	12	39.3	5.93	5.03	3.75
B4	8	42.0	5.39	2.34	0.27
A13	8	63.3	3.40	3.03	2.47

The above table indicates that there is considerable spatial variation in dissolved oxygen levels across each pond and that the Discharger may have trouble meeting the water quality objective for dissolved oxygen of 5.0 mg/L at the point of discharge. It also suggests that the Discharger needs to evaluate the potential for excessive algal growth and potentially low dissolved oxygen levels before commencing with a phased initial release in July of 2004.

pH

The data collected by the Applicants shows that pH does not exhibit a diurnal variation. As such, this memorandum included all values to determine the potential impact from this parameter. Table 2 below summarizes the number of sample points from each pond, the average salinity level, and the maximum, average, and minimum pH values from each pond.

Table 2: pH Levels

			pH		
Ponds	**Sample Points**	**Salinity**	**Maximum**	**Average**	**Minimum**
A2E	10	32.9	10.03	9.86	9.68
A3W	6	40.8	9.68	9.59	9.47
B2	12	39.3	8.27	8.16	8.07
B4	8	42.0	9.04	8.69	8.44
A13	8	63.3	8.57	8.52	8.47

The above table indicates that there is little spatial variation in pH across each pond and that the Discharger would likely have trouble meeting the water quality objective for pH of 6.5 to 8.5 at the discharge point. To minimize the potential for high pH values in the discharge, the Discharger needs to ensure that ponds have adequate flow through. It is also appropriate to consider a receiving water limitation for this parameter due to the impracticalities of chemically controlling pH in salt ponds to meet Basin Plan objectives.

Ambient Dissolved Oxygen and pH Variations

In order to put dissolved oxygen and pH values from the salt ponds within the context of ambient conditions in sloughs and in the south bay, we reviewed information from the South Bay Dischargers Authority Water Quality Monitoring Program Final Technical Report December 1981-November 1986 (hereafter Technical Report). The Technical Report indicates that some areas relatively unaffected by human disturbance, such as Newark Slough, have some low tide excursions below the 5 mg/L dissolved oxygen objective. Available ambient pH data indicate that the Basin Plan objective is consistently met in sloughs and in the south bay. Since pH is expected to normalize along the same line as salinity, we do not believe that it will not be an issue for continuous circulation.

As dissolved oxygen levels in sloughs that are representative of background conditions do not always meet the Basin Plan objective, it is appropriate to consider the frequency and magnitude of these excursions to determine the effect of discharges from salt ponds. Two sloughs that could be included in such an analysis are Faber Tract and Newark Slough. From May through October in 1985 and 1986, these sloughs were sampled twice per month at low tide. Table 3 below describes the average and minimum dissolved oxygen concentrations from Faber Tract and Newark Slough.

Table 3: Dissolved Oxygen at Low Tide in Background Sloughs

Slough	Dissolved Oxygen Average	Minimum	Samples Below 5.0 mg/L
Faber Tract	5.1	3.1	45%
Newark Slough	4.55	1.8	67%

It turns out that these samples represent a worst-case scenario for dissolved oxygen, as the tidal cycle tends to govern dissolved oxygen levels in relatively unaffected sloughs. The Technical Report indicates that dissolved levels increased with incoming tides and decreased to minimum levels with outgoing tides.

As these sloughs indicate that the Basin Plan objective for dissolved oxygen is not always achieved under ambient conditions, one approach for addressing discharges to sloughs would be to allow for some excursions of the Basin Plan objective at the point of discharge provided the Discharger documents that such discharges would not further depress dissolved oxygen levels in sloughs. It is unlikely that this approach would provide any relief for discharges directly to the south bay, as available ambient data does not show that dissolved oxygen levels within the bay are governed by the tidal cycle nor does it show excursions from the Basin Plan objective. To address potential dissolved oxygen excursions for discharges directly to the south bay, the Discharger may need to explore opportunities to operate these ponds as muted tidal systems.

Conclusion

The data set collected by the Applicants indicates that dissolved oxygen and pH levels do not meet Basin Plan objectives at the discharge point from certain ponds. However, it is difficult to collect data that will be fully representative of continuous circulation discharges for these parameters. This is because the amount of algal growth will relate to how quickly bay waters flow through pond systems. Based on our review of the data, we believe that a) the Discharger should ensure it has the ability to increase flow through, install portable aerators, and operate certain ponds as muted tidal systems, and b) waste discharge requirements should include flexibility that allows the Discharger to determine compliance with pH limits in the receiving water and to base dissolved oxygen limits on the Basin Plan or levels in the receiving water.

Attachment 4
Technical Memorandum: South Bay Salt Ponds Sediment Data

Summary
This memorandum concludes that the south bay salt ponds have not accumulated metals in the sediment above ambient levels and to a point where they could cause adverse biological affects. To reach this conclusion, Board staff compared sediment data that the Discharger provided in its Report of Waste Discharge and Initial Stewardship Plan (ISP) with screening criteria.

Screening Criteria
In order to determine if salt ponds have accumulated pollutants beyond background levels and to a point that could cause adverse biological affects, Board staff compared the level of inorganics in salt ponds to several screening criteria. These criterion include ambient inorganic levels in San Francisco Bay contained in a Regional Board staff report entitled *Ambient Concentrations of Toxic Chemicals in San Francisco Bay Sediments* (hereafter Sediment Report) and a publication by the National Oceanic Atmospheric Administration (NOAA) that established Effects Range-Low (ER-L) and Effects Range-Median (ER-M) toxicity based thresholds.

The Sediment Report summarizes ambient concentrations of chemical compounds found in San Francisco Bay sediments and recommends setting the ambient threshold at the 85th percentile. To relate the potential affects of toxic pollutants, NOAA published effect-ranges. The cutoff points corresponding to the effect ranges are the low (ER-L) and median (ER-M). The Report of Waste Discharge explains that NOAA calculated these values by examining a range of chemical concentrations associated with adverse biological affects. Further, the Report of Waste Discharge explains that the ER-L values represent the lower 10th percentile concentration of the data, and that concentrations near this value should rarely cause adverse biological effects, while the ER-M values represent the 50th percentile of the data and that concentrations above this value are likely to cause adverse biological effects.

Data Collection
The ISP provided sediment data in five summation tables based on the entity that performed sampling. As one of the main concerns with the salt ponds is that mercury might be have accumulated in the Alviso Ponds because of historic mining activities in this watershed, the Discharger focused its sediment sampling efforts in this area. In total, the Discharger collected 31 metal samples from the Alviso Ponds, four from the Baumberg Ponds, and one from the Redwood City Ponds.

Data Evaluation
As mercury is the only pollutant that is expected to differ significantly in the pond systems, Board staff considered two separate data sets for mercury: one from the Alviso Ponds and one from the Baumberg and Redwood City Ponds. To evaluate the remaining inorganics, Board staff considered them as one data set.

Inorganics: In analyzing inorganics (except mercury), Board staff compared the mean of all pond values (if normally distributed) or the median (if nonparametric) to ambient values contained in the Sediment Report and to the ER-L values published by NOAA. Table 1 below summarizes the results of this analysis:

Table 1: Summary of Inorganics in Salt Ponds and Screening Levels

Constituent[1]	Salt Pond Value[2]	**Ambient**	**ER-Low**	Above Ambient and ER-Low?
Arsenic	9.6	15.3	8.2	No
Cadmium	0.36	0.33	1.2	No
Chromium	93	112	81	No
Copper	35.3	68.1	34	No
Lead	28.4	43.2	46.7	No
Nickel	94.9	112	20.9	No
Selenium	0.59	0.64	N/A	No
Silver	0.18	0.58	1	No
Zinc	90.9	158	150	No

1 Data sets for arsenic, chromium, copper, lead, and zinc fit a normal distribution, whereas data sets for cadmium, nickel, selenium, and silver were nonparametric. Accordingly, the salt pond value for normally distributed parameters is the mean and the salt pond value for nonparametric parameters is the median.

2 These are mean or median values in mg/kg dry weight based on all data that met quality assurance/quality control requirements in the Discharger's Report of Waste Discharge.

As shown in the Table 1, cadmium is the only constituent that exceeded ambient levels in San Francisco Bay. To determine if the cadmium levels in the salt ponds could pose a threat to wildlife, Board staff compared salt pond values with the ER-L value published by NOAA. Based on this, neither cadmium nor the remaining metals described in Table 1 appear to be at levels of concern. While selenium levels are below ambient, Board staff requested that the Discharger collect additional baseline data for this pollutant because it is bioaccumulative, and it is listed as impairing South San Francisco Bay (Clean Water Act 303(d) list).

There are several constituents below ambient levels, but above the ER-L. These include arsenic, chromium, copper, and nickel. However, there would be little environment benefit in requiring salt pond sediment concentrations to fall below the ER-L if they are already below ambient levels. This is because once the Discharger restores salt ponds to tidal marsh; new substrate will ultimately be composed of sediment from surrounding sources.

Mercury: In analyzing mercury, Board staff evaluated two separate data sets since the Alviso Ponds should contain higher levels than those found elsewhere in the system, due to the historic mining legacy in this watershed. The results of this analysis are summarized in Table 2 below:

Table 2: Summary of Mercury in Salt Ponds and Ambient Levels

Pond Systems	Salt Pond Value[1]	Ambient[2]	ER-Low	ER-Median	Above Ambient and ER-Low?
Alviso	0.53	1.1	0.15	0.71	No
Baumberg/Redwood City	0.19	0.43	0.15	0.71	No

[1] The Alviso data set for mercury did not fit a normal distribution and the data set for Baumberg and Redwood City only consisted of five data points. Therefore, in this analysis the median values of mercury are compared to ambient levels. These values are in mg/kg dry weight and are based on all data that met quality assurance/quality control requirements in the Discharger's Report of Waste Discharge.

[2] As historic mining of mercury in the Alviso Pond watershed likely increased mercury values in these ponds, Board staff considered it appropriate to use the median of mercury levels found in the Guadalupe River to be indicative of ambient conditions in this locality. Since the Baumberg and Redwood City ponds should not be affected by mining activities, Board staff compared the mercury levels in these ponds with ambient levels in the Bay.

As shown in Table 2, mercury levels in the Alviso, Baumberg and Redwood City Ponds are below ambient levels. While mercury concentrations are below ambient levels, Board staff requested that the Discharger collect additional baseline data for mercury and methyl mercury so that it would be possible to evaluate the effect of the ISP and subsequent restoration on the availability of mercury to wildlife.

Conclusion

The Discharger has collected enough sediment data to demonstrate that salt ponds have not accumulated metals above ambient levels and to a point where they could have adverse affects on wildlife. To establish more extensive baseline levels for selenium and mercury (including speciation), the Discharger should collect additional sediment samples for these parameters before it initiates discharge.

ATTACHMENT E

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION
August 1993

STANDARD PROVISIONS AND REPORTING REQUIREMENTS

for

NON-NPDES WASTEWATER DISCHARGE PERMITS

A. GENERAL PROVISIONS

1. Neither the treatment nor the discharge of pollutants shall create a pollution, contamination, or nuisance as defined by Section 13050 of the California Water Code.

2. Duty to Comply

   a. The discharger must comply with all of the conditions of this permit. Any permit noncompliance constitutes a violation of the Porter-Cologne Water Quality Control Act and/or Basin Plan and is grounds for enforcement action.

   b The filing of a request by the discharger for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

3. Duty to Mitigate

   The discharger shall take all reasonable steps to minimize or prevent any discharge in violation of this order and permit which has a reasonable likelihood of adversely affecting public health or the environment, including such accelerated or additional monitoring as requested by the Board or Executive Officer to determine the nature and impact of the violation.

4. All facilities used for transport, treatment, or disposal of wastes shall be adequately protected against overflow or washout as the result of a 100-year frequency flood.

5. Collection, treatment, storage and disposal systems shall be operated in a manner that precludes public contact with wastewater, except where excluding the public is inappropriate, warning signs shall be posted.

6. Property Rights

   This Order and Permit does not convey any property rights of any sort or any exclusive privileges. The requirements prescribed herein do not authorize the commission of any act causing injury to the property of another, nor protect the discharger from liabilities under federal, state or local laws.

7. Inspection and Entry

   The Board or its authorized representatives shall be allowed:

   a. Entry upon premises where a regulated facility or activity is located or conducted, or where records are kept under the conditions of the order and permit;

b. Access to and copy at reasonable times any records that must be kept under the conditions of the order and permit;

c. To inspect at reasonable times any facility, equipment (including monitoring and control equipment), practices, or operations regulated or required under the order and permit; and

d. To photograph, sample, and monitor at reasonable times for the purpose of assuring compliance with the order and permit.

8. Permit Actions

This Order and Permit may be modified, revoked and reissued, or terminated in accordance with applicable State regulations. Cause for taking such action includes, but is not limited to any of the following:

a. Violation of any term or condition contained in the Order and Permit;

b. Obtaining the Order and Permit by misrepresentation, or by failure to disclose fully all relevant facts; and

c. Endangerment to public health or environment that can only be regulated to acceptable levels by order and permit modification or termination.

9. Duty to Provide Information

The discharger shall furnish, within a reasonable time, any information the Board may request to determine whether cause exists for modifying, revoking and reissuing, or terminating the permit. The discharger shall also furnish to the Board, upon request, copies of records required to be kept by its permit.

10. Waste Stream Diversion

The intentional diversion of waste streams from any portion of a treatment facility or authorized waste disposal system is prohibited. The Board may take enforcement action against the discharger for such diversions unless:

a. Waste stream diversion was unavoidable to prevent loss of life, personal injury, or severe property damage. (Severe property damage means substantial physical damage to property, damage to the treatment facilities that causes them to become inoperable, or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a diversion. Severe property damage does not mean economic loss caused by delays in production.);

b. There were no feasible alternatives to the diversion, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment down time. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a diversion which occurred during normal periods of equipment downtime or preventive maintenance; and

c. The discharger submitted advance notice of the need for a diversion to the Board. If the discharger knows in advance of the need for a diversion, it shall submit prior notice, if possible at least 10 days before the date of the diversion.

11. Availability

A copy of this permit shall be maintained at the discharge facility and be available at all times to operating personnel.

12. Continuation of Expired Permit

This permit continues in force and effect until a new permit is issued or the Board rescinds the permit. Only those dischargers authorized to discharge under the expiring permit are covered by the continued permit.

B. TREATMENT RELIABILITY

1. The discharger shall, at all times, properly operate and maintain all facilities and systems of treatment disposal and control (and related appurtenances) which are installed or used by the discharger to achieve compliance with this order and permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. All of these procedures shall be described in an Operation and Maintenance Manual. The discharger shall keep in a state of readiness all systems necessary to achieve compliance with the conditions of this order and permit. All systems, both those in service and reserve, shall be inspected and maintained on a regular basis. Records shall be kept of the tests and made available to the Board.

2. Safeguard to electric power failure:

   a. The discharger shall, within ninety (90) days of the effective date of this permit, submit to the Board for approval a description of the existing safeguards provided to assure that, should there be reduction, loss, or failure of electric power, the discharger shall comply with the terms and conditions of its Order. Such safeguards may include alternate power sources, standby generators, retention capacity, operating procedures or other means. A description of the safeguards provided shall include an analysis of the frequency, duration, and impact of power failures experienced over the past five years on effluent quality and on the capability of the discharger to comply with the terms and conditions of the Order. The adequacy of the safeguards is subject to the approval of the Board.

   b. Should the Board not approve the existing safeguards, the discharger shall, within ninety (90) days of having been advised by the Board that the existing safeguards are inadequate, provide to the Board a schedule of compliance for providing safeguards such that in the event of reduction, loss, or failure of electric power, the permittee shall comply with the terms and conditions of this permit. The schedule of compliance shall, upon approval of the Board Executive Officer, become a condition of the Order.

   c. If the discharger already has approved plan(s), the plan shall be revised and updated as specified in the plan or whenever there has been a material change in design or operation. A revised plan shall be submitted to the Board within ninety (90) days of the material change.

3. Waste treatment facilities subject to this order and permit shall be supervised and operated by persons possessing certificates of appropriate grade pursuant to Division 4, Chapter 14, Title 23 of the California Code of Regulations. (See Definition E. 4)

C. GENERAL REPORTING REQUIREMENTS

1. Signatory Requirements

   a. All reports required by the order and permit and other information requested by the Board shall be signed by a principal owner or operator, or by a duly authorized representative of that person.

   b. Certification

      All reports signed by a duly authorized representative under Provision C.1.a. shall contain the following certification:

      "I certify under penalty of law that this document and all attachments are prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who managed the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

2. Should the discharger discover that it failed to submit any relevant facts or that it submitted incorrect information in any report, it shall promptly submit the missing or correct information.

3. False Reporting

   Any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance shall be subject to enforcement procedures as identified in Section F of these Provisions.

4. Transfers

   a. This permit is not transferable to any person except after notice to the Board. The Board may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary.

   b Transfer of control or ownership of a waste treatment/disposal facility must be preceded by a notice to the Board at least 30 days in advance of the proposed transfer date. The notice must include a written agreement between the existing discharger and proposed discharger containing specific dates for transfer of responsibility, coverage, and liability between them. Whether an order and permit may be transferred without modification or revocation and reissuance is at the discretion of the Board. If order and permit modification or revocation and reissuance is necessary, transfer may be delayed 180 days after the Board's receipt of a complete application for waste discharge requirements.

5. Spill Prevention and Contingency Plans

The discharger shall file with the Board, for Executive Officer review and approval within ninety (90) days after the effective date of this Order, a technical report or a statement that the existing plan(s) was reviewed and updated, as appropriate, on preventive (failsafe) and contingency (cleanup) plans for controlling accidental discharges, and for minimizing the effect of such events. The technical report or updated revisions should:

a. Identify the possible sources of accidental loss, untreated or partially treated waste bypass, and polluted drainage. Loading and storage areas, power outage, waste treatment unit outage, and failure of process equipment, tanks and pipes should be considered.

b. Evaluate the effectiveness of present facilities and procedures and state when they became operational.

c. Predict the effectiveness of the proposed facilities and procedures and provide an implementation schedule containing interim and final dates when they will be constructed, implemented, or operational.

This Board, after review of the technical report or updated revisions, may establish conditions which it deems necessary to control accidental discharges and to minimize the effects of such events. Such conditions may be incorporated as part of this Order, upon notice to the discharger. If the discharger already has an approved plan(s) he shall update them as specified in the plan(s).

6. Compliance Reporting

a. Planned Changes

The discharger shall file with the Board a report of waste discharge at least 120 days before making any material change or proposed change in the character, location or volume of the discharge.

b. Compliance Schedules

Reports of compliance or noncompliance with, or any progress reports on, interim and final compliance dates contained in any compliance schedule shall be submitted within 10 working days following each scheduled date unless otherwise specified within this order and permit. If reporting noncompliance, the report shall include a description of the reason for failure to comply , a description and schedule of tasks necessary to achieve compliance and an estimated date for achieving full compliance. A final report shall be submitted within 10 working days of achieving full compliance, documenting full compliance

c. Anticipated Non-compliance

A discharger must provide adequate notice to the Board of any substantial or material change in the volume or character of pollutants being introduced into the waste treatment system.

Adequate notice shall include information on the quality and quantity of influent introduced as well as any anticipated impact of the change on the quantity or quality of effluent to be discharged from the waste treatment system.

d. Non-compliance Reporting (Twenty-four hour reporting:)

1) The discharger shall report any noncompliance that may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the permittee becomes aware of the circumstances. A written submission shall also be provided within five working days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times and, if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

2) The following shall be included as information that must be reported within 24 hours under this paragraph:

i. Any unanticipated discharge not authorized by this permit,

ii. Any waste treatment upset that exceeds any effluent limitation in this permit.

iii. Violation of a maximum daily discharge limitation for any of the pollutants listed in this permit to be reported within 24 hours.

3) The Board may waive the above-required written report on a case-by-case basis.

D. ENFORCEMENT

1. The provision contained in this enforcement section shall not act as a limitation on the statutory or regulatory authority of the Board.

2. Any violation of the permit constitutes violation of the California Water Code and regulations adopted thereunder and is the basis for enforcement action, permit termination, permit revocation and reissuance, denial of an application for permit reissuance; or a combination thereof.

3. The Board may impose administrative civil liability, may refer a discharger to the State Attorney General to seek civil monetary penalties, may seek injunctive relief or take other appropriate enforcement action as provided in the California Water Code or federal law for violation of Board orders.

4. It shall not be a defense for a discharger in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this order and permit.

E. DEFINITIONS

1. Duly authorized representative is one whose:

   a. Authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as general manager in a partnership, manager, operator of a well or a well field, superintendent, positon of equivalent responsibility, or an individual or positon having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named positon.); and

   b. Written authorization is submitted to the Board. If an authorization becomes no longer accurate because a different individual or positon has responsibility for the overall operation of the facility, a new authorization satisfying the requirements above must be submitted to the Board prior to or together with any reports, information, or applications to be signed by an authorized representative.

2. Severe property damage means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable or substantial and permanent oss of natural resources which can reasonably be expected to occur in the absence of an overflow. It does not mean economic loss caused by delays in production.

3. Waste Stream Diversion means the intentional diversion of waste streams from any portion of treatment facility.

4. Waste Treatment Facility means either:

   a. Any facility owned by a state, local, or federal agency and used in the treatment or reclamation of sewage and industrial wastes.

   b. Any privately owned facility used in the treatment or reclamation of sewage and industrial wastes, and regulated by the Public Utilities Commission pursuant to Sections 216 and 230.6 of, and hapter 4 (commencing with Section 701) of Part 1 of Division 1, of the Public Utilities Code.

5. Waste, waste discharge, discharge of waste, and discharge are used interchangeably in this order and permit. The requirements of this order and permit are applicable to the entire volume of water, and the material therein, which is disposed of to surface and ground waters of the State of California.